

## **Introduction**

This report describes activities performed by Snohomish County in the year 2002 to meet the requirements of the County's Stormwater Management Program, developed as a requirement of the County's National Pollutant Discharge Elimination System (NPDES) municipal storm sewer discharge permit.

## **S7B1 Stormwater Management Program Planning Process**

### **Stormwater Management Program for 1997 - 2000**

The County's Stormwater Management Program (SWMP) describing activities for the years 1997 - 2000 was approved by Ecology in a letter dated July 16, 1997.

### **Stormwater Management Program for 2001 and Beyond**

The NPDES permit issued in 1995 expired in 2000. Ecology has not yet issued a new permit. In 2000, Ecology extended the coverage of the 1995 permit until a new permit is issued, and directed Snohomish County to continue work under the terms described for the year 2000 in the approved SWMP.

## **S7B2 Water Quality Problems, Needs, and Priorities**

### **Analysis of needs and priorities**

In this report, Snohomish County is not proposing any changes to the priorities and needs identified in the approved Stormwater Management Program.

### **Water quality problems**

The following water quality reports were prepared by Snohomish County in the year 2002: Swamp Creek Illicit Discharge Remediation Project, Final Report for Centennial Grant No. G9900145. This report is attached.

## **S7B3 Legal Authority**

### **Adoption and enforcement of ordinance containing standards equivalent to the minimum requirements of Ecology's Stormwater Management Manual**

On August 3, 1998, the Snohomish County Council adopted by ordinance, development regulations that were deemed by Ecology to constitute the

functional equivalent of the minimum standards from Ecology's 1992 Stormwater Management Manual. These regulations became effective on September 19, 1998.

**Adoption and enforcement of ordinance prohibiting pollution discharges to the County's municipal storm sewer**

In March 1998, Snohomish County adopted Title 7.53 SCC (Water Pollution Control) that prohibited pollution discharges to the County's storm sewer and to surface and ground waters within the County. The code was readopted with some minor changes that clarified procedural responsibilities of the departments of Public Works and Planning and Development Services in 2001.

**Adoption and enforcement of ordinance containing standards equivalent to the minimum requirements of Ecology's Stormwater Management Manual**

On August 3, 1998, the Snohomish County Council adopted ordinance revisions that contain the equivalent of the minimum standards from Ecology's 1992 Stormwater Management Manual. These revisions became effective on September 19, 1998. Revisions were attached to the 1998 report.

**Adoption and enforcement of ordinance prohibiting pollution discharges to the County's municipal storm sewer**

In March 1998, Snohomish County adopted an ordinance that prohibits pollution discharges to the County's storm sewer and to surface and ground waters of the County. A copy of the ordinance was attached to the 1998 report. Since the adoption of the ordinance 44 water quality investigations have been referred for enforcement. Investigation and enforcement is discussed in section S7B8g Illicit Storm Sewer Discharge Elimination.

**S7B4 Monitoring**

**SURFACE WATER MANAGEMENT (SuWM)**

SuWM staff performed a number of monitoring activities during the reporting period. The information gained is used to guide a number of County activities including a basis for developing the County's response to listing of species under the Federal Endangered Species Act.

## Rainfall and stream-flow gaging

Table 1 shows the gauges operated in 2002. Rainfall and stream-flow gauging data were collected at 35 sites during the reporting period. Six of the sites are co-located with the long-term chemical monitoring sites. Data from all sites was processed and stored in a database with a web browser based user application for use by county staff and others. This database was upgraded in 2002. The data can be accessed at [www.co.snohomish.wa.us/publicwk/SuWM/spw\\_swhydro](http://www.co.snohomish.wa.us/publicwk/SuWM/spw_swhydro). The County also cost-shared on 4 gages operated by the USGS, and collected rainfall data from four volunteer operated sites.

**Table 1 - Gauges Operated in 2002**

<b>Gauge type</b>	<b>Number</b>
Base Stations	2
Repeaters	2
Field Sites	35
USGS	4
Volunteer	4
<b>Total</b>	<b>47</b>

## Long-term physical\chemical monitoring in streams and rivers

During the reporting period, SuWM conducted long-term monitoring as described in the permit on 25 sites. These sites are described in Table 2. Water samples at sites were analyzed for the parameters listed in Table 3.

Violations of water quality standards were found at all long-term monitoring sites. The data are used to estimate relative loads and concentrations of pollutants in County rivers and streams. This information can be used to focus assessment studies in watersheds with particular problems or to target management activities.

**Table 2 - Long-term Water Quality Monitoring Sites**

<b>Site</b>	<b>Location</b>	<b>Reason for Selection</b>
<i>Stillaguamish Watershed</i>		
CCPK	Church Creek at Church Creek Park	Major tributary to Stillaguamish, evaluates runoff to storm sewers from rapidly developing urban area
FISH	Mouth of Fish Creek	Major tributary to Portage Creek with rural residential and hobby farm runoff to storm sewers
PILC	Mouth of Pilchuck Creek	Largest tributary to lower Stillaguamish with runoff from forestry activities, rural residential, and farms
PORU	Upper Portage Creek at Bridge 311	Major tributary to Stillaguamish with runoff from rapidly developing area to storm sewers
PORL	Lower Portage Creek at Br. 92	Rural basin with agricultural runoff to storm sewers
TR30	Tributary 30 at Silvana Terrace Rd	Rural basin with runoff from commercial and hobby farms to storm sewers
MSAR	Mainstem Stillaguamish at Highway 9 at Arlington	Evaluates runoff from developing rural and residential areas to storm sewers
MSMD	Mainstem Stillaguamish at mouth	Evaluates cumulative effects of runoff to storm sewers
<i>Snohomish Watershed</i>		
QCLD	Quilceda Creek at 88th St NE	Evaluates cumulative runoff from agricultural and developing residential areas to storm sewers
ACLU	Allen Creek at 67th Ave NE	Rural basin with agricultural runoff
ACLD	Allen Creek at 3rd St	Evaluates runoff from rapidly developing residential areas to storm sewers
WCMF	Woods Creek main fork on Yaeger Rd	Major tributary to the Skykomish River with runoff from rural and hobby farm areas to storm sewers
WCWF	Woods Creek west fork on Yaeger Rd	Evaluates runoff to storm sewers from rural areas with moderate development
CATH	Catherine Creek	Evaluate contribution of Lake Stevens watershed to the Pilchuck River
LPIL	Little Pilchuck Creek -12th St NE	Evaluate contribution of Little Pilchuck to Pilchuck R.
DUBQ	Dubuque Creek on OK Mill Road	Evaluate contribution of Dubuque and Panther Creeks to Pilchuck River
PILR	Pilchuck River at 6th St	Downstream site on the Pilchuck River mainstem
FCLU	French Creek on 167th Ave	Evaluates rural and hobby farms runoff
FCLD	French Creek on Old Snohomish-Monroe Hwy	Evaluates commercial agriculture runoff

**Table 2 continued - Long-term Water Quality Monitoring Sites**

<i>Cedar/Green Watershed and Tributaries to Puget Sound</i>		
NCLU	North Creek at McCollum Park	Evaluates runoff to storm sewers from residential areas and hobby farms
NCLD	North Creek at Snohomish/King County line	Evaluates commercial, industrial, and high-density residential runoff
SCLU	Swamp Creek at 148 <sup>th</sup>	Evaluates commercial and residential runoff
SCLD	Swamp Creek at Snohomish/King County line	Evaluates commercial, industrial, and high-density residential runoff
LBLU	Little Bear Creek at 180 <sup>th</sup>	Evaluates residential and hobby farm runoff
LBLD	Little Bear Creek at 228th St	Evaluates rural and commercial runoff

**Table 3 - Long Term Water Quality Assessment Parameters**

<b>Parameter</b>	<b>Reason for selection</b>
Temperature	Fluctuations and ranges can affect aquatic species
Dissolved Oxygen	Indicator of ability to support aquatic species
pH	Range influences health of aquatic species, influences toxicity of metals
Conductivity	Indication of contaminants from road runoff, influences toxicity of metals
Stream height	Used in calculating stream discharge
Flow	Influences habitat and erosion, used in calculating discharge
Turbidity	Affects feeding and spawning of aquatic species, indicates erosion problems
Suspended Solids	Affects feeding and spawning of aquatic species, indicates erosion problems
Fecal Coliform	Indicates human or animal waste
Nitrate-nitrite	Indicates human or animal waste, contributes to algal blooms
Total phosphorus	Indicates human or animal waste or fertilizers, contributes to algal blooms
Copper	Indicates road runoff or runoff from commercial activities
Lead	Indicates road runoff or runoff from commercial activities
Zinc	Indicates road runoff or runoff from commercial activities

SuWM began long-term monitoring in the South County in 1992, in the Snohomish basin in 1993, and in the Stillaguamish basin in 1994. In 1999 a one-way analysis of variance was used to compare seasonal means. A general linear model was used for analysis of variance to compare individual water quality parameters by year and season. With seven to nine years of data available, the following parameters showed statistically significant trends over time:

- The mainstem Stillaguamish shows a significant decrease in bacteria and an increase in dissolved oxygen.
- In Glade Bekken of the Stillaguamish, bacteria concentrations decreased significantly. These decreases may be a result of numerous small farm best management practices that have been implemented in that watershed.
- The sites in the Stillaguamish watershed show an increase in conductivity. This increase may be a result of increased population and resulting road runoff.

- Sites in urban areas of the Snohomish and South County watersheds show a decrease in lead concentrations. This decrease may be a result of reduced ambient lead levels as unleaded fuels are more widely used.

Uses of the data during this reporting period included:

- providing background data for a citizen volunteer monitoring program in the Quilceda/Allen watershed under a Centennial Clean Water grant,
- providing data to Ecology for prioritizing water quality problems in the Stillaguamish watershed for water cleanup plans as part of establishing total maximum daily loads,
- developing and maintaining a database of all water quality, benthic invertebrate, and temperature logger data which is accessible on the Web,
- working with Ecology to develop a cleanup implementation plans for the Snohomish River tributaries and North Creek TMDLs, and
- providing discharge and staff data to engineers for design of fish passage culverts and lake level studies.

During this reporting period, the monitoring program staff coordinated with other permittees, municipalities, and tribes. The coordination included the following:

- continuing an inter-local agreement with the City of Bothell for monitoring in North Creek and maintaining a flow gauge,
- assisting the City of Marysville to develop a monitoring program,
- coordinating a sampling program with the City of Woodinville for monitoring in Little Bear Creek,
- assisting Ecology in TMDL studies in the Stillaguamish
- coordinating sampling with the Stillaguamish Tribe in the Stillaguamish watershed and sharing data with the, and assisting the Department of Health and Stillaguamish Tribe in water quality sampling in Port Susan for shellfish bed re-certification.

### **Short-term physical/chemical monitoring in streams and rivers**

During the reporting period, SuWM conducted short-term monitoring as described in the permit.

Beginning in April 2000, SuWM added four sites in the Little Bear Creek watershed to the two long-term sites already being monitored. The new sites are listed in Table 4. The site locations were chosen to divide the watershed into sub-basins by sampling major tributaries and sections of the mainstem. The data will be used as part of a watershed assessment to estimate pollutant concentrations and loads by sub-basin.

Data through 2002 show the highest bacteria levels in the upper mainstem with significant increases over the last two years. The geometric mean in the mainstem headwaters was 680 colonies/100 ml, decreasing to 200 col/100 ml in the lower mainstem in the City of Woodinville. Mean bacteria levels in the tributaries ranged from 30 to 85 col/100 ml. Levels of copper, lead, and zinc, in Little Bear Creek violate standards. The concentrations of metals are highest in the lower, more urban and commercial areas of the creek. High bacteria levels in the upper watershed led us to identify small farms with water quality problems in need of best management practices. We have worked with the Snohomish Conservation District in this area to develop farm plans and implement BMPs. High metals levels in the lower watershed made this area a focus for visiting businesses and providing technical assistance in reducing nonpoint pollution.

**Table 4 - Little Bear Creek Water Quality Monitoring Sites**

<b>Site</b>	<b>Location</b>
<b>LBHW</b>	Little Bear Headwaters on Interurban, just east of 51 <sup>st</sup> Ave SE
<b>TROT</b>	Trout Stream on Interurban, just east of LBHW at stables
<b>DANE</b>	Great Dane Creek on Maltby, just east of Little Bear Creek Road
<b>CUTT</b>	Cutthroat Creek, Hwy 9 south of Maltby Road, sample from private driveway with two mailboxes (21802 and 21806) on west side of road

### **Benthic invertebrate monitoring**

The permit states that SuWM will conduct benthic invertebrate monitoring in Glade Bekken in 1997 and 1998, and in French Creek in 1997 and 1999. In Glade Bekken, the monitoring plan was expanded to include evaluation of agricultural best management practices as well as measuring reference site conditions in the watershed. In 1997, SuWM conducted a countywide survey of 19 sites, which included the French Creek sites. A second county-wide survey including the agricultural sites was conducted during the fall of 1999. Monitoring in 2000 included the agricultural sites and the short-term sites in the Little Bear Creek watershed. Monitoring in 2001 included 5 agricultural BMP sites and 2 control sites. SuWM also monitored and addition 22 sites in the Stillaguamish watershed, of which 6 sites were part of a comparison study with Ecology's TMDL study. In 2002 SuWM monitored one agricultural BMP site in Church Creek and 16 sites in the Bear, Little Bear, North, and Swamp Creek watersheds. Table 5 presents the benthic invertebrate survey results for reference sites, and Table 6 presents the results for agricultural BMP monitoring.

Protocols for invertebrate monitoring followed those established by Ecology with modifications for use with the IBI, similar to the protocols used by King County. sampled riffles, taking three uncomposited, replicate samples at each site. We analyzed the data using James Karr's Index of Biological Integrity (IBI) for



benthic invertebrates for Puget Sound lowland streams to determine the level of impact from human activities, which combines ten measures of individual and population attributes into a score. The scores range from a low of 10 to a high of 50. The IBI scores give information that can be added to the data from the chemical monitoring to give a more comprehensive understanding of impacts from increasing development and stormwater runoff.

**Table 5 - Benthic invertebrate survey sites and locations**

<b>Benthic Invertebrate survey</b>	<b>1997 B-IBI</b>	<b>1998 B-IBI</b>	<b>1999 B-IBI</b>	<b>2000 B-IBI</b>	<b>2001 B-IBI</b>	<b>2002 B-IBI</b>	<b>Site location</b>
<b><i>Stillaguamish Watershed</i></b>							
Fish Creek	30		28		32		WQ site fish
Fish Creek					30		11 <sup>th</sup> Ave NE
Pilchuck Creek	24		28				WQ site pilc
Pilchuck Creek					24		Hwy 9
Pilchuck Creek					22		I 5
Pilchuck Creek					26		Stanwood-Bryant Rd
Church Creek					34		Woodland Rd
Church Creek					36		Twin City Elementery
Church Creek					32		Pioneer Hwy
Church Creek					30		Jensen Rd – Bridge 569
Church Creek					24		284 <sup>th</sup> St. East
Church Creek	28		28				WQ site cckpk
Secret Creek					34		5 <sup>th</sup> Ave off Dahl Rd
Riley Creek	30				36		Upstream of Jim Ck Rd
Armstrong Ck.					24		Stilly hatchery
Bear Creek					26		208 <sup>th</sup> St
Canyon Creek					24		124 <sup>th</sup> St
Jim Creek					24		Mouth at Jordan Rd
Jim Creek					28		Navy Base

**Table 5 continued - Benthic invertebrate survey sites and locations**

<b>Benthic Invertebrate survey</b>	<b>1997 B-IBI</b>	<b>1998 B-IBI</b>	<b>1999 B-IBI</b>	<b>2000 B-IBI</b>	<b>2001 B-IBI</b>	<b>2002 B-IBI</b>	<b>Site location</b>
Jim Creek					26		Whites Rd, Bridge 596
Kruger Ck					30		207 <sup>th</sup> St NE and Burn Rd
Portage Creek					24		206 <sup>th</sup> St NE and 61st
Portage Creek					34		80 <sup>th</sup> Ave NE
Prairie Creek					30		74 <sup>th</sup> Ave NE
<b><i>Snohomish Watershed</i></b>							
Wallace River			30				
May Creek			42				
Cemetery Creek (Snohomish trib)				28			Steward project, 85 <sup>TH</sup> , S of 72 <sup>ND</sup> on mainstem
French Creek gage	38		36				WQ site fclu
French Ck. upper mainstem, Meadowlake Rd.			34				S of 84 <sup>th</sup> St SE
French Ck. mid mainstem, Trombley			38				Downstream of horse crossing
French Ck, lower mainstem, 159th			30				Mainstem – 159 <sup>th</sup>
Cripple Creek	32		32				Upstream of 179th
Spada Ck			40				Trombley and Spada
Golf Course Ck			36				Downstream of Westwick Rd

**Table 5 continued - Benthic invertebrate survey sites and locations**

<b>Benthic Invertebrate survey</b>	<b>1997 B-IBI</b>	<b>1998 B-IBI</b>	<b>1999 B-IBI</b>	<b>2000 B-IBI</b>	<b>2001 B-IBI</b>	<b>2002 B-IBI</b>	<b>Site location</b>
<b><i>Snohomish Watershed, continued</i></b>							
Chain Lake Creek			18				Trombley and Chain L Rd
Upper Woods Creek			26				Off Woods Ck Rd
Woods – Lake Roesiger			36				Outlet from L Roesiger, above confluence w Woods
Woods Ck – Pipeline Rd			22				E of 21 <sup>st</sup> Ave SE
Woods Ck – Bridge 298			34				Bridge 298, S of powerline
Woods Creek mainstem	34		28				WQ site wcms
Woods Creek west fork	26		34				WQ site wcwf
Woods Creek lower mainstem	24						Buck Island Park
Carpenter Ck downstream			38				Creswell Rd
Carpenter Ck – upstream			34				Sanders Rd
Friar Ck			34				Upstream of 104 <sup>th</sup> ST SE
Pilchuck R mouth	24						Snohomish City Park, S of 92 <sup>nd</sup> St SE
Pilchuck R – 28 <sup>th</sup> Pl. NE	24						28 PI NE, off Russell Rd
Pilchuck R – Snohomish Bridge 304			20				WQ site pilc
Little Pilchuck Creek			34				WQ site lpil
Catherine Creek			26				WQ site cath
Dubuque Creek			32				WQ site dubq

**Table 5 continued - Benthic invertebrate survey sites and locations**

<b>Benthic Invertebrate survey</b>	<b>1997 B-IBI</b>	<b>1998 B-IBI</b>	<b>1999 B-IBI</b>	<b>2000 B-IBI</b>	<b>2001 B-IBI</b>	<b>2002 B-IBI</b>	<b>Site location</b>
<b><i>Snohomish Watershed, continued</i></b>							
Panther Creek	26		30				Upstream of 16 <sup>th</sup> St SE
Bunk Foss			14				Downstream of culvert on Machias Rd
Sexton Creek			26				Upstream of 131 <sup>st</sup> Ave SE
Munson Creek	16		24				Grove St past 69 <sup>th</sup>
Quilceda middle fork	30		30				Wade Rd, Centennial Trail
<b><i>South County Watershed</i></b>							
Norma Creek	20		18				WQ site psld
North Creek gage	18		16			20	WQ site nclld, UW site
North Creek						28	164 <sup>th</sup> St
North Creek						28	192 <sup>nd</sup> St
North Creek						24	208 <sup>th</sup> St
Silver Creek						18	208 <sup>th</sup> St
Penny Creek						16	9 <sup>th</sup> Av SE
Penny Creek						20	Mill Creek
Nickel Creek						22	Hwy 527
Sulphur Creek						22	196 <sup>th</sup> St SE
Swamp Creek gage	22		20			28	WQ site scld
Swamp Creek						20	164 <sup>th</sup> ST
Swamp Creek						30	Larch and Locust
Little Bear upstream	34		34	30			WQ site lblu, UW site
Little Bear downstream	30		28	30			WQ site lbld, UW site
Little Bear headwaters				34			WQ site lbhw
Trout Stream				34			WQ site trot
Great Dane Creek				34			WQ site dane

**Table 5 continued - Benthic invertebrate survey sites and locations**

<b>Benthic Invertebrate survey</b>	<b>1997 B-IBI</b>	<b>1998 B-IBI</b>	<b>1999 B-IBI</b>	<b>2000 B-IBI</b>	<b>2001 B-IBI</b>	<b>2002 B-IBI</b>	<b>Site location</b>
<b><i>South County Watershed, continued</i></b>							
Cutthroat Creek				34		38	WQ site cutt
Little Bear near mouth				28			Woodinville site lwcc
Cutthroat Creek						38	Highway 9 project
Little Bear mainstem						36	189 <sup>th</sup> St SE
Bear Creek						16	Headwaters at Paradise Lake Rd

**Table 6 - B-IBI results at agricultural BMP project sites**

<b>Benthic Invertebrate survey</b>	<b>1997 B-IBI</b>	<b>1998 B-IBI</b>	<b>1999 B-IBI</b>	<b>2000 B-IBI</b>	<b>2001 B-IBI</b>	<b>2002 B-IBI</b>	<b>Site location</b>
Glade Bekken - 220th (Stillaguamish tribe)	32	32	32	32	34		Reference site
Glade Bekken - Sylvana Terrace	28	30	36	32	32		Reference sites, WQ site tr30
Glade Bekken - mouth	26 pre	28 pre	34 post	30 post	24		Headrick project evaluation, WQ site t30a
Trib 30 – channel			22 post	20 post			Constructed channel, middle of Headrick project
Trib 33	20 pre	22 pre	18 post	16 post	18		Tatum project evaluation, WQ site t33
Trib 31	22 pre	28 post	26 post	28 post	18		Neff project evaluation, WQ site t31
Oso fencing project (Stillaguamish trib)		24 pre	26	28 post	34		BMP evaluation, SCD project, 179 <sup>th</sup> St off Hwy 530
Stables Creek project (French Creek)			28 pre	38 post	38		BMP evaluation, 96 <sup>th</sup> St SE
Church Creek						34 pre	BMP evaluation, Jensen Road

## **Physical/chemical monitoring of lakes**

### Routine Monitoring

During the summer of 2002, SuWM staff and citizen volunteers monitored 26 priority public access lakes four times during the growing season--once each month in June, July, August, and September. The lakes were Armstrong, Blackman, Bosworth, Cassidy, Chain, Cochran, Crabapple, Echo, Flowing, Goodwin, Howard, Ketchum, Ki, Loma, Lost, Martha (N), Martha (S), Panther, Riley, Roesiger, Serene, Shoecraft, Stickney, Storm, Sunday, and Wagner. In addition, SuWM staff and volunteers monitored Beecher, Kayak, Meadow, Nina, Rowland and Ruggs lakes four times during the summer. Drainage Improvement District #8 of Lake Stevens also monitored Lake Stevens bi-weekly and Lake Cassidy twice during this period.

During each monthly sampling period, SuWM staff monitored 10 of the priority lakes (Bosworth, Cassidy, Chain, Echo, Flowing, Howard, Loma, Lost, Martha (S), and Wagner) at one meter intervals throughout the water column for temperature, dissolved oxygen, pH, and conductivity using a Hydrolab Minisonde. Staff collected samples from the epilimnion and the hypolimnion of each lake for lab analysis of total phosphorus concentrations and from the epilimnion only for analysis of chlorophyll *a* concentrations. Secchi depth measurements and qualitative observations of algae and zooplankton abundance were also made for each lake.

Selected citizen volunteers monitored the remaining 16 priority lakes during the same one week periods each month. The volunteers collected epilimnion and hypolimnion total phosphorus samples, epilimnion chlorophyll *a* samples, and made Secchi depth measurements and qualitative observations of algae and zooplankton abundance, in the same manner as done at the staff-monitored lakes. At 12 of these lakes, the volunteers also collected dissolved oxygen and temperature profile data throughout the water column using LaMotte kits and modified vertical water samplers. At the remaining lakes (Beecher, Kayak, Meadow, Nina, Rowland, and Ruggs), volunteers collected epilimnion and hypolimnion total phosphorus samples and made Secchi depth measurements and qualitative observations of algae and zooplankton.

Sampling during 2002 was conducted at the deepest point in each lake because that is the location where the water quality parameters are most representative of the overall lake conditions. Monthly monitoring from the June through September period provides a representative picture of lake health during the growing season. The warm months of the growing season represent the period when the lakes are most likely to exhibit problems with excess algae or aquatic plants that interfere with use of the lakes. Inputs of nutrients from stormwater

and other nonpoint sources during the year can also be reflected in the summertime lake productivity. Monthly monitoring from June through September also satisfies the guideline of four sampling events for establishing lake nutrient standards in accordance with the state water quality regulations (WAC 173-201A). The averages from four epilimnion total phosphorus and chlorophyll *a* samples also provide a basis for determining the trophic status of each lake. Combined with the summer average Secchi depths recorded by citizen volunteers and staff, the total phosphorus and chlorophyll *a* averages give a more comprehensive view of lake conditions.

### Basic Volunteer Monitoring

During 2002, SuWM staff supported citizen volunteers at 22 lakes in Snohomish County. These lakes were: Armstrong, Beecher, Blackman, Cochran, Crabapple, Goodwin, Howard, Kayak, Ketchum, Ki, , Martha (N), Nina, Panther, Riley, Roesiger, Rowland, Ruggs, Serene, Shoecraft, Stickney, Storm, and Sunday.

Basic volunteer monitoring includes measurements of Secchi depths, surface temperatures, and lake levels, as well as observations about lake color and shoreline/watershed conditions. Volunteers are asked to monitor every two weeks from May through October to cover the entire growing season. The amount of data received from individual volunteers in 2002 varied from two observations to almost twenty. In addition, as described above, volunteers at 12 lakes measured dissolved oxygen and temperature profiles within the water columns approximately once per month using LaMotte kits and sampling bottles, as well as collected total phosphorus and chlorophyll *a* samples.

The volunteer monitoring program is an important element of physical/chemical lake monitoring because the data are combined with staff monitoring to better assess lake conditions and the potential impacts of nonpoint pollution. All of the 26 priority lakes receive runoff from County roads and from residential properties. Regular and on-going monitoring is the primary means of assessing the impacts of such nonpoint pollution.

### Data Analysis and Reporting

SuWM staff managed and analyzed lake quality data using a SQL server database with an Access client interface. Monitoring results were provided to volunteers, the general public, and other agencies as requested. In addition, SuWM staff launched an online database in 2002, making all lake quality data available to anyone with Internet access at [http://www.co.snohomish.wa.us/publicwk/SuWM/spw\\_swhydro/](http://www.co.snohomish.wa.us/publicwk/SuWM/spw_swhydro/). During 2002,



staff worked to complete a report of all the lake monitoring data collected in recent years. This overall report will be published in 2003.

#### Public Education Conducted as Part of the Lake Monitoring Program

SuWM staff conducted a training workshop for all the citizen volunteers in May 2002. Staff trained the volunteers to correctly perform lake monitoring and provided information about evaluating lake data, working with neighbors, being a watchdog for their lakes, and using BMPs to protect water quality around their homes. Also during the year, SuWM staff took advantage of opportunities for one-on-one public education on a regular basis when they encountered citizens while in the field for lake monitoring and when citizens called with questions about lakes.

#### **Discussion of water quality problems, needs, and priorities**

In previous annual reports we discussed water quality problems by watershed and land use. The major land uses we considered were residential/commercial, agriculture, and forestry. We found that water quality problems are similar for a single land use, regardless of the location. Using previous water quality data, field information, and professional judgment, we ranked the severity of water quality problems and listed unmet needs. During the term of this permit, we have used the monitoring program to identify trends in pollutants over time by watershed and land use, identify pollutants and sources in specific sub-basins, and begin to fill data gaps and unmet needs.

Information on long-term water quality trends is limited, but rapid changes in land use patterns continue to pose challenges for maintaining water quality. SuWM began monitoring programs from 1992-1994 in many watersheds in the County. We are learning more about the current condition of our streams and are beginning to have sufficient data for long-term trend analyses. Results of biological monitoring from 1997- 2002 indicate that the aquatic life in our lowland streams and rivers is in fair or poor condition.

Chemical monitoring data show no major deterioration in the quality of our waters since the early 1990's, but most streams and rivers are still not meeting state water quality standards. We are seeing a slight decline in levels of lead in streams in the more urban areas in the Snohomish and South County watersheds. This decrease in lead is a result of the use of unleaded fuels. However, baseline monitoring in the Stillaguamish mainstem and tributaries has shown an increase in conductivity from 1994 through 1999. Conductivity is an indicator of contaminants in streams from road runoff. This increase is likely a result of increased population in the watershed and the resulting increase in traffic on roads.

Although an increase in conductivity in the Stillaguamish is a cause for concern, we are seeing decreases in bacteria concentrations in that watershed. Ecology found improving trends in bacteria in both the North and South Forks as well as a significant decrease in bacteria and ammonia in the lower mainstem. This decrease in the mainstem may be a result of recent upgrades at the Arlington Sewage Treatment Plant. Data also show an overall decrease in bacteria and an increase in dissolved oxygen at all sites in the lower watershed since 1994. However, monitoring data indicate that temperature, bacteria, nutrient, and sediment concentrations increase between the upper mainstem at Arlington to the lower mainstem at Marine Drive. In addition, bacteria concentrations still violate state standards in many of the tributaries. While overall bacteria levels in the Stillaguamish are declining, we still need continuing improvements to meet state standards in both the mainstem and the tributaries. We are currently working with Ecology, the Conservation District, the Stillaguamish Tribe, and the Department of Health to identify sources of bacterial contamination in the lower mainstem and estuary of the Stillaguamish River.

During the term of this permit, we have conducted short-term monitoring at six sites in the Glade Bekken watershed. As a result, we have identified pollutants and potential sources which have resulted in implementation of restoration projects. In Glade Bekken, small farms were identified as the main source of bacteria and nutrients. Glade Bekken shows decreased bacteria levels since 1994. This decrease may be a response to the numerous best management practices implemented on small farms in the watershed. However, sediment levels show only a slight decrease and nitrate concentrations have not changed. The results in Glade Bekken show that improvements in water quality require a long-term commitment from both agencies and citizens working together.

In April 2000, we began monitoring in Little Bear Creek watershed, where bacteria and nutrients have been identified as water quality problems. We are using the monitoring results to identify sources and help prioritize projects to improve water quality. High bacteria levels in the upper watershed led us to identify small farms with water quality problems in need of best management practices. High metals levels in the lower watershed made this area a focus for visiting businesses and providing technical assistance in reducing nonpoint pollution.

### **Storm sewer monitoring in commercial / industrial areas**

Storm sewer monitoring in commercial and industrial areas was conducted in the upper Swamp Creek Watershed as part of the Centennial Clean Water Fund Swamp Creek Illicit Discharge Remediation Grant. This monitoring continued

through the year 2001 and a final project report was submitted to Ecology in 2002. We inspected 98 businesses within the project area and discovered potential pollution sources at 48 of them. These problems were resolved in one or several visits. The most common pollution source was vehicle and equipment wash water. Ambient monitoring conducted upstream and downstream of the project area showed decreased turbidity at both sites and no changes in other parameters. Stormwater runoff from two sites was analyzed to determine if the business education program was successful. Total suspended solids decreased at both stormwater sites and fecal coliform bacteria decreased at one location.

### **S7B5 Fiscal Analysis**

Table 7 shows shows calculated or estimated actual expenditures for 2002, compared to the expenditures proposed in the Program. In some cases, expenditures could be directly tracked in the County's financial system. In other cases, costs were estimated from information such as the total number of actions of a certain kind multiplied by the estimated average cost, or the knowledge that a certain person worked a certain number of hours in total on NPDES-related tasks.

**Table 7 - 2002 proposed and actual expenditures (in \$1,000 units)**

<b>Program element</b>	<b>Proposed expend. (Based upon 2000 Exp)</b>	<b>Actual expend.</b>	<b>Comments</b>
<b>S7B1 - permit admin</b>	57	33	
<b>S7B2 - needs assessment</b>	15	17	
<b>S7B3 - legal authority</b>	20	20	
<b>S7B4 - monitoring</b>	281	507	
<b>S7B5 - fiscal analysis</b>	0	0	
<b>S7B6 - data management</b>	96	1242	Increase due to intensive storm sewer mapping in UGA's (completed in 2002)
<b>S7B7 - intergovernmental coordination</b>	18	15	
<b>S7B8a - new development runoff</b>	358	333	
<b>S7B8b - existing residential / commercial development runoff</b>	273	742	
<b>S7B8c - storm sewer O/M</b>	802	1782	Increase in road maintenance division costs
<b>S7B8d - road O/M</b>	83	615	Increase in road maintenance division costs
<b>S7B8e - wq in flood projects</b>	0	0	
<b>S7B8f - pesticide/fertilizer pollution control</b>	0	0	
<b>S7B8g - illicit discharge control</b>	185	278	
<b>S7b8h industrial runoff</b>	28	3	
<b>S7B8i - education</b>	290	522	
<b>TOTAL</b>	<b>2506</b>	<b>6109</b>	The primary reasons for increased expenditures are the intensive storm sewer mapping and expenditures in road maintenance division.

## **S7B6 Data Management**

### **PLANNING AND DEVELOPMENT SERVICES (PDS)**

#### **Development and maintenance of land use, zoning and environmental GIS data sets and maps.**

1. GIS data and map products continue to be updated for the GMA Comprehensive Plan – Future Land Use. This includes the maintenance and update of data through adopted revisions to the plan designations in the unincorporated county area and in the urban growth areas. The Future Land Use designations are currently being converted to the new high accuracy Integrated Land Records (ILR) parcel base.
2. Future land use planning for the Mill Creek – East Urban Growth Area and the Clearview study area required GIS data, display mapping and plan document mapping that was completed in 2002.
3. Urban growth area boundary – city boundary maps have been produced using the new high accuracy Integrated Land Records (ILR) parcel base, and are continually updated with annexations and UGA boundary revisions.
4. In conjunction with the GMA Comprehensive Plan, PDS has mapped open space / greenbelt, commercial agriculture, forestry, and lands useful for public purpose for the county in GIS digital format.
5. Micro Analysis Zone boundaries were converted to the new ILR parcel base in 2002. The data set is now being used by the Dept. of Public Works Transportation Planning Div. for use in updating the Transportation Element of the County Comprehensive Plan.
6. The Urban Centers projects have continued to use the PDS GIS support for required GIS data set construction, statistical analysis, consultant coordination, and the preparation of map displays, and graphics.
7. The PDS Future Land Use plan update docketing project required GIS data and map support for the 2002 final and 2003 initial Docketing processes.
8. The Future Land Use Plan Mineral Lands study continued to use GIS data analysis, inventory and display mapping products.
9. Capital facility sewer and water GIS data sets continued to be enhanced with additional line data. This information was used in the Capital Facility plan document.
10. The PDS ¼ section zoning maps, the current digital zoning GIS data set and small scale display maps continue to be updated and maintained by PDS.

11. Zoning data conversion from the current low accuracy digital parcel base to the new ILR parcel base was initiated in 2002. Digital conversion and adjustment of the master data set was completed. Quality control processes are now underway.
12. Conversion of supporting information layers that are included on the PDS ¼ section zoning maps began in 2002. The digital layers are being constructed from hard copy information and put into GIS data coverages. These GIS layers will be used with the newly converted master zoning data, (and the ILR parcel base), to construct new ¼ section zoning maps.
13. PDS in cooperation with other County departments, the BIA and the Tulalip Tribes have developed a tribal trust lands data base, GIS ArcView project distribution application, GIS display map and an update/revision process to accurately identify tribal trust lands in Snohomish County.
14. PDS wetlands survey from 1988 was converted to a digital GIS data set. The data was registered to the updated GIS hydro data set, (that was adjusted by PDS GIS staff in 2002), and to the new ILR parcel base.
15. The engineering staff within PDS continues to utilize GIS during plan review to assist in their assessment of site plans and development proposals.

## **AIRPORT**

### **Mapping and assessment of storm sewer**

Storm sewer data is available on the Airport autocad system. New improvements will be integrated into the autocad system.

Airport has funded an additional \$50,000 for mapping of Big Gulch System in 2003.

## **SURFACE WATER MANAGEMENT (SuWM)**

### **Land Cover Information Maps**

Existing and future land cover data layers are an integral part of the data pieces used for hydrologic modeling. Snohomish County Planning and Development Services (PDS) develops land use maps for selected portions of urban growth management areas within the County. The land use maps developed by PDS are based on the most current digital orthophotography available for an area and on fieldwork. Snohomish County Surface Water Management (SuWM) modifies the land use data created by PDS to obtain a generalized land cover data set. In

developing the land cover data, typically assigns an effective impervious rating and a land cover (for example, lawn, forest, pasture) for each of the land use designations mapped by PDS.

SuWM is now looking at using new tools, such as remote sensing, to replace or supplement the existing methods for generating land cover information used for modeling.

- **Status** During the 2002 reporting period, SuWM continued working on scanning existing aerial photos from previous years into GIS. This work has focused on the floodplain and riparian areas along the Stillaguamish River, Skykomish River, and Snohomish River. Once the photos are rectified, they can be used for riparian change analysis type work. SuWM staff use the photos and analysis work in determining changes in habitat for endangered species. SuWM also purchased satellite imagery and will be working to develop remote sensing capabilities for land cover and vegetative analysis.

### **Hydrologic Database Development**

The Department of Information Services GIS Division is responsible for maintenance of the 1:24,000 GIS hydrograph layer used by Surface Water Management and Snohomish County. In 2002, additional improvements to the County's hydrologic data sets were made by DIS. The Hydrography (Hydro) Realignment Project undertaken by DIS in 2002 placed emphasis on specifically addressed the challenge of improving both the spatial accuracy and improving the spatial and attribute accuracy of the hydrography data, to enhance its usability for analysis, mapping and applications.

As results of the Hydrography (Hydro) Realignment Project, most of the major water bodies within the County (but outside of the Urban Growth Areas) have been re-digitized to spatially match their locations as seen on the Washington State Department of Natural Resource's 1998 ortho-photography. Riverbanks, side channels, sand-gravel deposits, and vegetated island features have been either remapped or newly digitized to match the same features seen on the photos. The photos defined not only the spatially accuracy of features digitized, but also which features were captured as part of this project. All significant hydrographic features seen on the photos were digitized and attributed at a scale of approximately 1:6000.

The Stillaguamish and Snohomish riverbanks have been routed using the Arc/Info dynamic segmentation software. The routing provides the database format for mapping and analyzing bank condition data that was captured as part of the field survey completed by Surface Water Management in 2002.

The correcting of spatial accuracy of streams, adding of new streams, and update of attribute data is an ongoing process. SuWM is always striving to improve on the accuracy of the data layer, both in terms of attribute data and positional accuracy of the stream location.

- **Status** In 2002, as part of the Drainage Needs Reports Project, GIS/GPS efforts focused on conducting GPS infrastructure inventory of constructed and natural drainage features within Urban Growth Areas. High accuracy GPS locations on stream culverts and stream cross sections will provide the spatial accuracy for moving and realigning and enhancing hydrography within the urban areas of Snohomish County. SuWM originally anticipated realigning and enhancing the hydrography in the unincorporated urban growth area in 2002. This task was pushed back to 2003, primarily because the infrastructure inventory was not completed until the end of 2002. Where appropriate, streams will be relocated or new tributaries added based on the detailed Drainage Needs Report Project Infrastructure Inventory.

### **Description and Location of Major Structural BMPs and Other Structural Controls**

Inclusion of drainage facilities (e.g., detention facilities, catch basins, pipes, swales, ditches, outfalls, etc.) as a data layer on GIS will enhance SuWM's response to drainage service requests and SuWM's overall understanding of water flow through the constructed and natural drainage systems.

- **Status** SuWM is using Global Positioning System equipment to locate and attribute drainage infrastructure (for example, catch basins, pipes, driveway culverts, roadside ditches, swales, detention facilities, illicit discharge locations, etc.). The GIS drainage network generated from the GPS inventory is highly accurate (e.g., 1": 2400") with horizontal and vertical locations within  $\pm 2 - 5$  cm. The high accurate GIS drainage network fits well with the overall County GIS plan to develop a high accuracy data layer based on the integrated land record data set.

During the 2001 and 2002 reporting period, SuWM undertook and completed a detailed GPS inventory of approximately 73 square miles of unincorporated Snohomish County within the Urban Growth Areas.

Through December 31, 2002, SuWM GPS crews have inventoried and collected 30,327 catch basins, 32,034 drain point features, and 136,437 cross section features for a total of 198,798 point features. The staff have added 71,224 network arcs for a total of 270,022 drainage inventory features (points and arcs). The DNR Infrastructure Inventory data is available to all County employees on the County network via an established ArcView and ArcExplorer project.

DNR Drainage Infrastructure Inventory maps, in PDF format, are available for viewing from the SuWM web page. More than 1400 maps by section and quarter-section are available for viewing. These are static maps that are refreshed with new or updated inventory data every two weeks. SuWM is



working on an ArcIMS application that would allow users to access and query the DNR Infrastructure Inventory data over the web.

### **Mapping of Storm Sewer Outfalls and Tributary Conveyances**

Accurate identification and mapping of storm water outfalls, incorporation of outfall locations into a GIS infrastructure data layer, and connecting that outfall to a GIS drainage network is very important to the tracking of pollutants from the natural system up through the constructed drainage system to a source location.

Similarly, the accurate identification and mapping of small feeder tributaries or ephemeral streams and incorporation into a GIS hydrology layer is important to the protection of the natural drainage network.

- **Status** As part of the Drainage Needs Report Project, SuWM is conducting an infrastructure inventory of all constructed and natural drainage features within the Urban Growth Areas of Snohomish County. Outfalls are noted in the attribute dictionary and can be mapped as needed within the Urban Growth Areas.

### **Maintenance of SuWM GIS Data Layers and Databases**

Maintenance and update of all SuWM GIS project data layers and databases are important to all SuWM programs, including mandated programs such as NPDES. SuWM maintains GIS coverages and data sets (for example, precipitation, stream flow, water quality) that are important for hydrologic and hydraulic modeling purposes and other SuWM programs and activities.

- **Status** SuWM maintains GIS layers and databases that were developed by SuWM for analysis, display, and modeling.

### **S7B7 Intergovernmental Coordination**

#### **SURFACE WATER MANAGEMENT (SuWM)**

##### **General coordination for monitoring, mapping, data management, and modeling**

SuWM participates in a regional group of scientists working on establishing common protocols for biological monitoring of area streams. During this period, SuWM worked with cities and drainage and diking districts to develop inter-local agreements for cooperative surface water management. A long-standing agreement with the city of Bothell was continued, covering cooperative water

quality monitoring, stream flow gaging, facility payment, and watershed stewardship activities. Pursuant to an agreement with the City of Lake Stevens and Drainage District 8 to set a framework for long-term service provision and the transition of services in annexed areas, the County continued a cooperative effort with these agencies to develop a level of service agreement. The County and City of Lake Stevens continued an inter-local agreement for operation and management of an aeration system for Lake Stevens.

### **General coordination for control of stormwater pollution from other jurisdictions**

Snohomish County has an interlocal agreement with the City of Bothell for ongoing Surface Water Management Division services. Cost sharing and planning for the construction and operation of the North Creek Regional Stormwater Detention facility, stream-gaging operation, ambient water quality monitoring and watershed stewardship activities within the North Creek basin are included in this agreement. The County operates a rain gage and a stream gage located within the City of Bothell. Continued operation and maintenance of this gage is important to assess stream flow changes and stormwater trends in North Creek. One of the long-term water quality monitoring sites is located within the City of Bothell upstream of the flow gage. Continued operation of this long-term water quality monitoring site is important for tracking long-term water quality trends in the watershed with statistical confidence. Gaging information and water quality results are shared with the City of Bothell.

SuWM is a co-director of an interagency group that coordinates water quality programs, monitoring, restoration, and outreach in the Stillaguamish River watershed. SuWM has provided GIS services in support of this effort, and GIS information is available to other jurisdictions.

SuWM has completed a Memorandum of Understanding with the Washington State Department of Transportation (WSDOT) that allows staff to perform storm sewer investigations in the WSDOT right-of-ways other than I-5, throughout the County. These investigations are described in the portion of Section S7B8g - Illicit Discharge Elimination Program. The MOU is valid through the end of the year 2003.

SuWM has entered into a Memorandum of Understanding with King County, under which King County provides Microtox™ analyses for outfall screening and commercial/industrial monitoring samples. The agreement is valid until the end of 2003.

SuWM submitted an annual work program and plan to WSDOT for surface water activities related to minimizing and mitigating pollution from state highways, as

part of the justification for receiving utility fees from WSDOT. This work includes monitoring, outreach, illicit discharge investigation, and other activities. In 2002, Snohomish County provided funding in excess of \$286,600 to the Snohomish Conservation District, in exchange for professional services including assisting farmers in implementing agricultural best management practices.

SuWM staff participate in an NPDES permittees' group that discusses coordination and implementation issues, including monitoring, investigation, and enforcement. The group meets approximately quarterly.

### **Development of coordinated Stormwater Management Plans (SWMPs) for waterbodies shared with other municipal permittees**

SuWM has continued discussions with King County Water and Land Resources Division to discuss coordination on specific SWMP elements, with no firm outcomes yet. Our goal is to make tangible progress in coordinating certain elements for the next SWMP. We expect that the programs most affected would be monitoring, data management, and stormwater planning.

## **PLANNING AND DEVELOPMENT SERVICES (PDS)**

### **Interjurisdictional Policies on Natural Environment, Parks and Recreation and Open Space:**

Implementation has continued to occur incrementally as local jurisdictions within the county prepare, adopt, and update their GMA comprehensive plans in consideration of these policies.

All jurisdictions within the County have agreed via Snohomish County Tomorrow to consider these policies in preparation of their plans, so changes in jurisdictional boundaries will have no effect on their implementation. No incorporations have occurred since adoption of the policies, primarily city/county boundary changes have occurred as a result of small annexations over the past 2000 and 2001 reporting period.

Several annexations were initiated at Bickford Road/Cemetery Creek drainage basin in Snohomish and Cedarholm in Stanwood and many other smaller parcels.

The following intergovernmental coordination activities of Planning and Development Services were pursued during the past years.

- Review and comment on updates to Growth Management Act (GMA) comprehensive plans of cities in Snohomish County for consistency with inter-jurisdictional policies pertaining to Land Use, Capital Facilities, Natural Environment, Parks and Recreation and Open Space which relate to surface water impacts.
- Coordinate county review and response to municipal annexation, consolidation and incorporation proposals. Draft and negotiate master annexation inter-local agreements and ongoing individual annexation addendums to those agreements. The agreements address coordination and transition of Public Works, Surface Water Management responsibilities including fees and service responsibilities, maintenance and ownership responsibilities, improvement responsibilities and watershed planning. Many of these are now being handled via the internet and internal web page to get the word out to the public on what is proposed to be annexed.
- Participate in implementation of policies in the Snohomish County GMA Comprehensive Plan - General Policy Plan (GPP) that recommend working with cities in Snohomish County to undertake joint planning, financing and development of regional stormwater detention and flood control projects to mitigate run-off impacts to receiving waters.
- Develop sub area plans for urban growth areas through inter-local agreements for joint planning between the county and cities in Snohomish County to implement policies and directives in the GPP. Urbanization impacts to surface water and drainage are being analyzed and recommendations to control impacts are incorporated into the UGA plans as policies, plan map designations and implementation measures. The Lake Stevens Sunnyside Plan was an example of this type of effort.
- The following on-going GMA Planning projects intended to respond to neighborhood and stakeholder interests are as follows:
  - Clearview sub area planning effort
  - Mill Creek East UGA plan (covers Penny and Tambark Creek drainage basins)
  - Marysville/Lakewood plan (Quilceda/Allen drainages)
  - Southwest UGA and MUGA projects and potential integration of essential public facilities like the proposed King County DNR Brightwater Sewerage Treatment Plant, numerous meetings were held in 2002 to assist in the siting of this facility with special interest in protection of the Little Bear Creek system.

- Provide oversight to the Snohomish Conservation District through an inter-local agreement for funding of farm management plans and best management practices implementation that will reduce the potential for non-point pollution to receiving waters. Support efforts to reduce pollutants to ESA waters via Farm Plans or approved grading permits or use of best management practices and model farms.

## **General Policy Plan**

The policies of the GPP calling for interjurisdictional planning that addresses surface water quality issues are being implemented as the county and cities incrementally prepare subarea plans for urban growth areas (UGA). Water quality issues have been addressed in UGA plans using methods such as continuation of rural Shoreline Management provisions for an area added to a UGA and the use of “planned zones,” requiring development plan approval, along stream and river corridors. Full implementation of critical area regulations which incorporate ESA stream protection measures also implements portions of the Natural Environment Chapter within the GPP.

Subarea plans for the Gold Bar, Snohomish, and Mill Creek UGA have been adopted. A subarea plan for the Lake Stevens UGA was finally adopted in 2001 a historic event after years of discussion, debate and deliberation, a growth phasing overlay was a key element of adoption. Subarea plans for the Arlington UGA, Marysville UGA, and the Penny Creek and Tambark Creek corridor, east of Mill Creek was finalized. The master plan for the Smokey Point area, addressing Quilceda/Allen watershed issues, will be prepared as a second phase of the UGA subarea planning for Arlington and Marysville. This plan will require further work addressing a sensitive aquifer recharge area and potential measures for protection. The schedule for updating the current Critical Aquifer Recharge Area (CARA) ordinance was extended by state law to the end of 2004, although the County Council may elect to update the Critical Area Regulations (CAR) on a more expedited schedule.

Portions of some UGAs that are subject to current or future interjurisdictional planning were annexed and are no longer under the land use jurisdiction of the county.

## **Interlocal Agreements for Joint Planning Between the County and its Cities**

The interlocal agreements for joint planning between the county and the cities and towns are intended to implement GPP policies as described above under “General Policy Plan.” As mentioned above, subarea plans for the Gold Bar, Snohomish, and Mill Creek UGA have been adopted. A subarea plan for the Lake Stevens UGA was finalized in 2001. Final Plans for the Arlington UGA,

Marysville UGA, and the Tambark Creek corridor, east of Mill Creek, are still under preparation. Public Works completed the Drainage Needs Reports(DNR) in 2002 that required analysis across City/County jurisdictional lines to fully understand flows and impacts downstream.

OFM population forecasts/capital facilities update continues to work closely with cities and sewer districts to assist in growth model predictions.

The buildable lands report in all jurisdictions within Snohomish County was completed in 2002 to assist in allocation of sufficient buildable lands based upon the above population forecasts.

### **Interlocal Agreements Concerning Annexation Within Cities' Growth Planning Areas**

Snohomish County reached agreement with Monroe on a master annexation inter-local in August 1996. The agreement addresses coordination and transition of Public Works Surface Water Management responsibilities with Monroe within a designated surface water management area. The agreement addresses fees and service responsibilities, maintenance and ownership responsibilities, improvement responsibilities and watershed planning. The agreement notes that implementation of the watershed planning section will require negotiation of a more specific sub-agreements between the County and Monroe.

Snohomish County is currently discussing similar master annexation inter-local agreements with Lake Stevens, Marysville, Stanwood, Arlington and Snohomish. The manner in which these subsequent inter-locals are formally negotiated has not been finalized. However, Snohomish County intends to use the county water pollution control ordinance and the state water quality standards as a basis of any agreements. The inter-local agreements are specifically intended to address issues related to annexations, which may include water quality issues. Note, based on several recent judicial decisions the total number of annexations received in 2002 decreased from prior peak years.

### **Memorandum of Understanding with the Snohomish Conservation District:**

Consistent with the 1993 Memorandum of Understanding and annual funding agreement between Snohomish County and the Snohomish Conservation District, efforts continued throughout the period to assist farmers in implementing agricultural best management practices that will reduce or eliminate non-point sources of pollution. Negotiations were initiated to renew the Memorandum of Understanding for the 1998-2002 time period.

**S7B8a      Runoff from new development and redevelopment**

**PROSECUTING ATTORNEY / PLANNING AND DEVELOPMENT SERVICES /  
SURFACE WATER MANAGEMENT**

**Development of ordinance containing minimum technical requirements  
equivalent to those in Ecology's Stormwater Manual, and development of  
County stormwater guidance manual equivalent to that of Ecology's  
Stormwater Manual**

On August 3, 1998, the Snohomish County Council adopted ordinance revisions that contain the equivalent of the equivalent of the minimum standards from Ecology's 1992 Stormwater Management Manual. These revisions became effective on September 19, 1998.

The County adopted the remaining portions of the Ecology Stormwater Manual and a County-developed addendum as development guidance in September 1998. Following adoption, the addendum was sent to Ecology for equivalency consideration and a letter was received indicating DOE's position on equivalency.

**ROAD MAINTENANCE (RM)**

**Compliance with construction document and performance requirements of  
Ecology's Stormwater Manual.**

Construction site erosion and sediment control (ESC) measures are implemented during maintenance activities, and on construction sites, to minimize water pollution. ESC techniques are implemented in accordance with the Stormwater Manual, the draft Regional Road Maintenance Endangered Species Act Program Guidelines, County Drainage Manual and Snohomish County Unified Development Code Title 30, Subtitle 30.6, Environmental Standards and Mitigation, or with construction plans, for maintenance and construction projects. Proper implementation of ESC measures is monitored by supervisors, lead workers and other staff who have been trained in ESC techniques and practices.

**SURFACE WATER MANAGEMENT (SuWM)**

**Compliance with construction document and performance requirements of  
Ecology's Stormwater Manual.**

The Drainage Rehabilitation and Investigation (DRI) program designs and constructs projects to correct localized drainage problems. All projects are

designed in accordance with Ecology's Stormwater Manual and are reviewed for compliance with the requirements of the manual

## **PLANNING AND DEVELOPMENT SERVICES (PDS)**

### **Review of construction documents for compliance with Ecology's Stormwater Management Manual**

Over 90% of all construction documents received either meet the 1992 Ecology's Stormwater Management Manual criteria for storage and release or infiltrate the run-off or develop less than 5000 square feet of new impervious surfaces and would be considered exempt due to that minimum threshold size by DOE.

In certain areas Snohomish County has elected to exceed Ecology's minimum standards, for example the winter grading restrictions or limitations are more stringent than the 2-day cover requirement, which is already adopted. These more stringent requirements were maintained throughout 2002, but are under consideration for removal in 2003.

PDS reviews construction documents for grading, drainage and erosion control consistent with chapter 17.05 and Title 24 SCC. During 2002, PDS completed reformatting of the various development codes. This is now called the Uniform Development Code (UDC) and the new chapter for drainage is 30.63A, replacing Title 24 SCC; grading is chapter 30.63B replacing chapter 17.05.

On going training is occurring within PDS to stay current with upcoming revisions to the 1992 Manual. Certain Federal, State or County projects may elect to comply with the 2001 DOE Stormwater Management Manual through the current Modification or Waiver process.

### **Inspection and enforcement of land use ordinances.**

PDS inspects private construction to ensure compliance with approved drainage plans, including proper implementation of erosion and sedimentation control (ESC) measures. Inspections are performed on a regular basis during the course of each construction project. The number of inspections on each project varies by the nature, complexity, and duration of the project. This group reviews new construction, plat roads, right-of-way construction, and utility work. As part of larger projects, review of Stormwater Pollution Prevention Plans (SWPPP) has now become an industry standard for those larger projects that create more than 5 acres of exposed earth. Oversight of the full drainage plan review and construction plan approval process as well as all new work within the county right of way is by a registered professional civil engineer.



PDS provides training in ESC to construction inspectors and code compliance officers.

If field inspections show that approved drainage plans are not properly implemented, PDS is authorized under Snohomish County UDC Chapter 30.85 replacing Title 28 to take enforcement actions, including: issuing stop-work orders, suspending or revoking permits, and requiring discontinuance of actions which violate codes or standards of performance. Corrective actions are then imposed under a prescribed compliance schedule. Further, the County in general has the authority to assess civil and criminal penalties for code violations.

The emphasis to a Voluntary correction and compliance process was made as a result of the rewrite of the Enforcement Procedures in Chapter 30.85.

The County has assigned a high priority to ensure that erosion and sedimentation problems at construction sites do not occur. To this end, PDS will perform all necessary inspection and enforcement in an effective and timely manner.

Currently, PDS allocates 5 FTE's annually to investigate reports of construction activity conducted without proper grading permit or drainage plan approval, and to enforce applicable County land use codes Chapter 30.63A formerly Title 24, drainage, Chapter 30.63B formerly Chapter 17.05, grading and Chapter 7.53 Water Pollution Control. This group lost 1 position in 2002 due to budgetary constraints during an overall department wide reduction in force as well as losing some of the senior supervisory staff to retirements. This investigation and enforcement team will continue to provide an effective and timely response to complaints and investigations in a professional and courteous manner during the term of the permit.

During the term of the permit, PDS staff will coordinate work with DPW Surface Water Management and Ecology staff on issues related to construction sites with significant erosion and sedimentation problems.

The history as of 2002 activity:

1,184 total active files from 1998 through 2002 – grading/drainage complaints:

- 35 ongoing investigations (open)
- 77 Notice & Order (Administrative Enforcement/Appeals)
- 48 sent to Prosecuting Attorney
- 1,024 closed

41 total active drainage complaints from 1998 - 2002:

- 2 ongoing NPDES investigations
- 39 closed

## **AIRPORT**

### **Compliance with construction document and performance requirements of Ecology's Stormwater Manual.**

The following activities were performed:

- West Ramp Hangar Project – Sediment and Erosion Control inspections conducted by staff.
- North Ramp Hangar Project – Sediment and Erosion Control inspections conducted by staff.
- Solid Waste Transfer Station – Sediment and Erosion Control inspections conducted by Public Works.

## **PARKS**

### **Compliance with construction document and performance requirements of Ecology's Stormwater Manual.**

During the reporting period all construction documents developed for Parks conformed with the requirements delineated in the Ecology Stormwater Management Manual. All contractors secured to work on Parks projects performed in accordance with the Manual.

The majority of park projects are designed and constructed by private contractors secured through the public bidding process. Construction permits are obtained through Planning and Development Services (PDS) who also are responsible through inspection for permit compliance. Some small capital projects are designed by private consultants and constructed by Parks maintenance employees. These projects also require permits and subsequent construction inspection by PDS.

## **ENGINEERING SERVICES (ES)**

### **Compliance with construction document and performance requirements of Ecology's Stormwater Manual.**

ES designs and constructs projects for several County agencies. During this period of the permit, ES has ensured that drainage design and erosion / sedimentation control measures incorporated into construction documents and implemented in the field were in accordance with Ecology's Stormwater Manual (and the County's Addendum thereto). Experience has shown that the combination of proper design and strict field enforcement prevents violations. These practices will be continued.

## **SOLID WASTE MANAGEMENT (SoWM)**

### **Compliance with construction document and performance requirements of Ecology's Stormwater Manual**

Design for the replacement and expansion of the Southwest Recycling & Transfer Station (SWRTS) was completed. Construction was planned for 2003, due to late receipt of a Section 404 permit. Construction of the Airport Road Recycling & Transfer Station (ARTS) commenced, and will replace the Everett Recycling & Transfer station (ERTS). Plans and specifications of both new facilities include requirements for runoff control and water quality in conformance with the Stormwater Manual and County drainage and construction standards. Design development includes Drainage Plans, Critical Areas studies and Erosion Control Plans. Both projects have NPDES Construction Permits and will require NPDES Industrial Activity Permits for operation.

## **S7B8b Existing Residential and Commercial Development Runoff**

### **AIRPORT**

#### **Assessment and modification of existing Airport detention facilities.**

Airport and Goodrich are working on a modification to a closure valve at the inlet to Wetland 25. Goodrich is the lead on the project. We anticipate the upgrade by 3<sup>rd</sup> quarter of 2003. The valve will no longer be manually operated.

## **SOLID WASTE MANAGEMENT (SoWM)**

### **Assessment and modification of existing SoWM detention**

Required wet and dry season inspection of Solid Waste facilities with Industrial Stormwater Permits, conducted in March and September respectively, did not reveal any need for modification of detention structures. Structures were found to be properly maintained and functioning. Runoff running easterly from the entrance area of the closed Cathcart Landfill Site was rerouted as part of the 132<sup>nd</sup> Street (Cathcart Way) road construction to a new detention and treatment pond. This pond also collects the new roadway runoff and ultimately releases stormwater to the Snohomish River.

## **SURFACE WATER MANAGEMENT (SuWM)**

### **Capital projects to improve stormwater quality or mitigate stormwater effects**

SWM conducted retrofits on 3 detentions ponds and designed water quality improvements for 7 additional facilities to be constructed in future years. These projects improve stormwater quality and mitigate stormwater effects.

### **Assessment and modification of existing residential detention and infiltration facilities maintained by the County**

The assessment was completed and submitted to Ecology with the 1999 SWMP assessment.

### **Bank stabilization and re-vegetation of sensitive areas**

SuWM initiated and/or managed 55 citizen based stream planting, bank stabilization, and stream clean up.

### **Livestock management projects**

Several programs are currently underway to manage livestock in Snohomish, the most important being partnerships with Snohomish Conservation District (SCD).

In 2002, the Snohomish Conservation District conducted the following work on 60 small farms using funding partially provided by SUWM:

- Five tree planting projects covering 3.75 acres along streams

- Installed 2.9 miles of fencing, much of which was to exclude livestock from streams and wetlands.
- Implemented 271 BMPs on small farms.
- Forty-one new site visits to assess small farm practices and to provide technical assistance.
- Designed a variety of water quality BMPs on 7 small farms and did project planning on 95 small farms
- Conducted follow up visits on 19 farms to evaluate need for maintenance on BMPs

### **Technical Assistance/Information**

Watershed Stewards provided technical information or assistance to approximately 1,222 landowners on planting native vegetation along the streams to filter pollutants, improve habitat, and to stabilize banks.

### **Native Plant Program**

The Native Plant Program volunteers salvaged over 5,500 native plants from development sites throughout the county. In addition volunteers containerized 10,000 barefoot native plants purchased from area nurseries for future plantings. Volunteers contributed over 7500 hours of service to the program and the county. Plants were stockpiled at the new Lake Stevens Native Plant Holding Facility and Nursery for later replanting on riparian restoration projects. The program responded to 105 requests for technical information regarding native plants, riparian and wetland plant communities, and restoration.

The Native Plant Program provided plant materials and technical support for numerous watershed steward and CIP river habitat stream buffer plantings in the Snohomish, Stillaguamish, and Sammamish River basin accounted elsewhere in this report. Over 7500 native plants left the nursery for these projects.

The Native Plant Stewardship Program partnered with the Washington Native Plant Society to provide instruction on appreciation, conservation, restoration of native plants and native plant communities. Twenty-five participants received 80 hours of classroom instruction and 20 hours of field instruction. Stewards return 100 hours of volunteer service in assistance with riparian restoration projects. Class had strong emphasis on riparian and wetland communities highlighting the function and contribution native plants make to water quality and quantity. Native Plant Stewards returned over 1200 hrs to county projects in 2002.

**S7B8c      Municipal Storm Sewer Operation and Maintenance**

**SURFACE WATER MANAGEMENT (SuWM)**

**Inspection and maintenance of detention facilities serving residential areas and the County road right-of-way**

SuWM completed 355 inspections of residential and road-related stormwater facilities in 2002. One hundred and thirteen stormwater detention facilities were maintained by the County. (SuWM funded the maintenance of 90 residential facilities; Road Maintenance funded the maintenance of 23 facilities.) Many more facilities were maintained either by the developer or by property owners.

SuWM also completed inspections of 36 commercial detention facilities, to ensure that they function properly.

**Development and implementation of an ordinance defining private storm sewer system maintenance responsibilities.**

The revisions to Snohomish County Title 24 that were adopted in August 1998, clearly define responsibilities for private storm sewer maintenance.

**ROAD MAINTENANCE (RM)**

**Maintenance of catch basins, pipes, and open ditches**

During the period from January 2002 through December, 2002, 3,317 catch basins were cleaned. Approximately 22.3 miles of enclosed storm sewer pipes were cleaned. Two additional vactor/jetter units were purchased during the fourth quarter of 2001. The addition of these two units has increased the accomplishments in this area.

Ditch maintenance during the same period consisted of cleaning 50 miles of ditches using either a Ditchmaster or backhoe, 1,306 lane miles of brush cutting and 12,011 lane miles of mowing along ditches. Best management practices for ditch maintenance include securing the necessary permits such as HPA, and practices such as working in no or low flow conditions, flow diversion, erosion and sediment control, and re-establishing vegetation on bare soils to prevent erosion.

Vactor grit continues to be processed through Snohomish County Solid Waste's vactor waste decant facilities. Options continue to be explored by the Solid Waste Division and RM to recycle the solids and the liquids in a manner

consistent with DOE and Snohomish Health District guidelines. Vector grit is currently being recycled by a local asphalt vendor, incorporating it into asphalt mix. Road Maintenance is exploring options for additional decant sites, including proposed construction of a decant facility at the Arlington shop, and field decanting of vector liquid in approved detention ponds consistent with the 2001 Ecology Stormwater Manual.

### **Storm sewer maintenance at Solid Waste and Parks facilities**

The maintenance frequencies for cleaning the Solid Waste division's catch basins and pipes for the period January 2002 to December 2002 are similar to those established for the previous period. The maintenance is generally performed on a weekly basis at Solid Waste facilities. Storm sewer maintenance for the Parks department is performed on a request basis rather than on a regular routine basis, but is generally performed on a seasonal basis. The vector grit from Parks facilities, and sludge from solid waste facilities, is processed through Solid Waste's vector waste decant facility. Options continue to be explored by Solid Waste and RM to recycle the solids and the liquids in a manner consistent with Ecology and Snohomish Health District guidelines.

## **SOLID WASTE MANAGEMENT (SoWM)**

### **Vector waste decant facility O/M**

Operation of this facility continues with vector wastes accepted from County, WSDOT, the city of Mill Creek, Wallace Falls State Park, and three private vactoring firms. Although 2001 saw a significant drop in tonnage, use of the facility held steady this past year and is now averaging 163 tons of grit per month for the year.

Vector grit from non-contaminated spoils continued to be recycled through Wilder Construction in Everett for most of the year. In Fall 2002, the contract with Wilder expired. A new contract with Rabanco now allows ALL material collected to be recycled for use as daily cover. Price per ton is less and staff hours spent separating material has been eliminated. In addition, Rabanco transports the grit from the facility, another savings in staff and equipment costs. A total of 1,201 tons was recycled in 2002. The tonnage recycled now represents 63% of that received, which is significantly up from 2001. This should approximate 100% next year under the new contract.

No difficulties have arisen in operating the facility and maintenance has been minimal. All O&M costs are borne by user fees.

### **Storm sewer O/M at SoWM facilities**

Road Maintenance is scheduled at least monthly to vector storm and sewer catch basins at three County transfer stations and annually at Cathcart Landfill facility. In March 2002, the annual wet season inspections did not reveal inadequate cleaning periods or deficiencies requiring repair. In September 2002, catch basins and storm drainage structures at industrial NPDES-permitted facilities were inspected during the annual dry inspection for unusual or illicit flows - none were found.

### **AIRPORT**

Airport performs regular maintenance on (of) the stormwater conveyance system. Maintenance includes detention pond maintenance and cleaning of system.

## **S7B8d County Road Operation and Maintenance**

### **ROAD MAINTENANCE (RM)**

#### **Sanding and deicing**

The total amount of sand applied to county roads for the period January 2002 through December 2002 was 8,614 tons. For comparison purposes, during the same period in 2001, 2,738 tons of sand were applied. Approximately 9,000 tons of sand was applied in the period January 1998 to June 1999, and 24,000 tons of sand was applied in 1997. The primary reason for the significant differences between 1997 levels and 1998 to 2002 application levels was the difference in winter weather experienced during those seasons, and lighter application and more discriminating use of sand, such as on hills and curves. RM continues to explore alternative products for snow and ice control. During the 4<sup>th</sup> quarter of 2002, RM purchased equipment for the application of Calcium Magnesium Acetate, or CMA, that may be used as an additive, or alternative to sand. RM plans to use CME primarily as an anti-icing strategy. However, the product may also be used as a de-icer to assist with snow and ice removal. CMA has been found to be effective at preventing the formation of ice on pavement. It has also been found to be environmentally sound and can drastically reduce the amount of sand used during snow and ice events.



## **Sweeping**

To an extent, the resources expended towards sweeping are dependent on the amount of sanding activity that occurs as a result of inclement weather. The Division purchased two high efficiency sweepers in the fall of 2002. During the period January, 2002 to December 2002, approximately 6,620 lane miles were swept.

RM has two facilities with prefabricated structures in which to store sweepings, until such time as the trash and deleterious material has been removed from the sweepings, and the sweepings have been tested to determine recycling / reuse options. One building is located at the Arlington shop, the other at the Cathcart facility. Both are currently in use for storage and recycling of sweepings.

## **Wooden bridge deck repair**

During the period January, 2002 to December, 2002, the RM division continued the use of State-approved wood preservatives in bridge members to minimize water pollution. Wood used in maintenance operations is treated with Chemonite, a state approved wood preservative and alternative to Creosote. Water based/water borne paints and sealers are used for painting and sealing bridges. RM sweeps and removes debris from bridge decks, on average, approximately once per year. This practice reduces the amount of material and waste that enters streams from bridges. Bridge maintenance practices avoid creating sediment and pollution by using appropriate best management practices.

## **Bridge painting**

Steel truss bridges are painted by contractors using water-based paint. See also "Cleaning lead painted bridge structures" below. Spot painting is performed, as necessary, by RM crews, using water-based paint. Only 6 County maintained steel truss bridges remain in Snohomish County. Numerous steel truss bridges have been replaced with low maintenance concrete structures, resulting in less impact to the environment and water quality.

## **Cleaning lead painted bridge structures**

Lead painted bridge structures are cleaned by contractors, prior to full painting, using containment and waste disposal practices in accordance with applicable regulations. See also "Bridge Painting" above. Spot cleaning is performed by RM using containment and waste disposal practices in accordance with applicable regulations.

### **Guardrail maintenance**

Creosote-treated posts are no longer used for the installation or maintenance of guardrail. Guardrail posts are treated with chemonite, a State-approved, environmentally sound wood preservative. Guardrails are generally unpainted. Painted guardrails are only used in those areas where visibility is critical to ensure the safety of the motoring public. In those situations, guardrails are painted using a water based acrylic paint.

Where possible, concrete jersey barriers are used in lieu of guardrails, in new installations. Jersey barriers do not require the level of maintenance that guardrails require and are easier to install.

### **Asphalt patching**

Thermolay trucks used for asphalt patching utilize a self-contained process that yields very little waste. The waste that is created is contained and disposed of in accordance with State regulations. The diesel-tack by-product generated by patching operations is accumulated for recycling in an above ground storage tank (AST) at the RM Arlington Shop facility. The AST is permitted by the City of Arlington (the jurisdictional authority), and meets the EPA Federal regulations for AST's. An approved recycling contractor recovers the material from the tank.

Stormwater pollution is also controlled by avoiding the use of petroleum based products for cleaning tools and equipment in paving operations. Biodegradable, citrus based products are effectively used for cleanup of tools, thereby avoiding the use of more harmful petroleum products. Emulsified asphalt is used as a tackifier for asphalt patching operations. Best management practices for application of these products includes spill prevention, spill recovery, and avoiding application during wet weather conditions.

### **Thermoplastic marker installation**

RM continues the use of newer technology equipment, purchased in 1998, for the application of thermoplastics. The equipment is more efficient than older versions, and produces virtually no waste products that have to be disposed of. Waste material is recycled in the machine and reused. The only impact on water quality from the process is the particles that result from wear of the product as traffic runs over it. Frequent sweeping can mitigate the effects of these products.

### **Raised Pavement markers**

RM continues the use of an adhesive product and melter, which eliminates hazardous waste clean up. The older two-part epoxy products are no longer used. The new equipment recycles its clean-up waste. As a result there are minimal waste by-products.

### **Paint striping**

RM continues the use of water-based, acrylic emulsion water-borne paints for use in roadway paint striping. The paints contain no lead or petroleum solvents. The paints used meet or exceed federal VOC standards

### **Solid waste removal**

There was no change in the equipment, materials or the processes used for the removal of hazardous or non-hazardous wastes from our sites or the road system during the term of this permit.

### **Asphalt / bituminous surface treatment**

There has been no change in the equipment, materials or the processes used in the application of asphalt concrete pavements or bituminous surface treatments in the past twelve months. All excess asphalt, as well as asphalt removed during excavation operations, is recycled.

Stormwater pollution is controlled by avoiding the use of petroleum based products for cleaning tools and equipment in paving operations. Biodegradable, citrus based products are effectively used as a release agent for dump truck beds, and for cleanup of tools, thereby avoiding the use of more harmful petroleum products such as diesel.

Emulsified asphalt is used as a tackifier for pavement overlays, and as the bituminous layer in bituminous surface treatment (BST) applications. The emulsified asphalt is diluted by the manufacturer using water and soap, rather than a petroleum based "cutback" agent. Best management practices for application of these products includes spill prevention, spill recovery, and avoiding application during wet weather conditions or when the threat of rain exists. Emulsified asphalt is applied in areas sized such that it can be covered within the day and not exposed to traffic and weather for extended periods of time. These BMP's effectively mitigate the possible contamination of surface water runoff from paving operations.

### **Gravel road surfacing**

RM continues to practice maintenance methods that minimize disturbance in the wet months, to minimize turbidity. Roads are graded and compacted, and ditches and culverts are maintained to minimize surface water runoff. Gravel roads are treated with a dust palliative, lignin-sulfonate, an approved substance that is a wood by-product of pulp mills. The dust palliative aids in maintaining a hard, compact surface and minimizes fugitive dusts.

### **Dust control**

During 2002, RM continued the practice of applying Lignin-sulfonate to gravel roads as a dust palliative. This work is now done under contract and supervised by District Supervisors and/or Lead workers. The equipment, materials and process used in the application of dust control treatments are substantially the same as that used during the previous term. Public Works has a program in place to pave or chip seal most of the county maintained gravel roads, thus eliminating the dust emission and turbidity problems from this source. Since 1993, Snohomish County has eliminated approximately 125 miles of gravel roads by paving with asphalt concrete pavement or bituminous surface treatment, reducing the inventory of gravel roads to less than 10 miles.

## **S7B8e      Water Quality Consideration in flood management projects**

### **SURFACE WATER MANAGEMENT (SuWM)**

#### **Levee design, maintenance, and operation**

SuWM spent \$160,000 in 2002 on projects to maintain levees or construct river stabilization repair projects to protect County roads and bridges. Practices were in accordance with the approved Stormwater Management Program. No new levees were built in the reporting period. Regular inspection, maintenance and vegetation control were performed or scheduled on 27 County-owned structures. Levees were reseeded for erosion control where appropriate.

## **S7B8f      Runoff from Pesticide and Fertilizer Application**

### **AIRPORT**

#### **Application of pesticides and fertilizer by County employees**

Airport maintenance staff that apply pesticides have current training and licenses.

## **PARKS**

### **Application of pesticides and fertilizers by County employees**

Application of pesticides and fertilizers by Parks employees continues to be in compliance with the approved NPDES Program.

The Parks Habitat Steward, hired in 2001, has primary responsibility at Parks for vegetation management, including pesticide/fertilizer application and noxious weed control. Rangers and maintenance staff do not apply pesticides. Fertilizer application is closely monitored and controlled using natural products where feasible with an emphasis on minimizing runoff.

Late in 2001, with the hiring of the Parks Habitat Steward, Parks initiated work on Integrated Vegetation Management (IVM) guidance for Parks-owned public park lands and offer specific strategies for weed and pest control, including noxious weeds, at specific park properties. A draft was completed in 2002 and is now under review.

## **ROAD MAINTENANCE (RM)**

### **Application of pesticides and fertilizer by County employees**

Snohomish County Road Maintenance uses no pesticides or herbicides for roadside vegetation management, and has not done so since November 1, 1992. Only mechanical methods (mowers, graders and brush cutters) are used to control roadside vegetation, thus soil residual herbicides/pesticides are eliminated.

State law requires the County to control noxious weeds within the right-of-way. The noxious weed control activity was transferred to the Road Maintenance Division on January 1, 1999. A small amount of herbicide is used in spot applications to control noxious weeds. Employees performing this work are licensed in the application of pesticides and herbicides and work under the R.C.W. authority of Snohomish County Noxious Weed Control Board.

## **SOLID WASTE MANAGEMENT (SoWM)**

### **Application of pesticides and fertilizer by County employees**

Occasional use of relatively benign herbicides such as Roundup has continued to be practiced for 2002. Pesticides are not being used. All chemicals are being kept in covered storage areas away from precipitation and storm drainage.

### **Education**

General information about the environmental effects from the irresponsible use of herbicides and pesticides was made available at County sponsored household hazardous waste collection events (6 two-day and one 7-day events in 2002) and daily at the County's household hazardous waste drop off facility. Five hundred pamphlets produced by the Washington Toxics Coalition that encourage the use of less toxic alternative products and methods were distributed to families on request.

Eight thousand Natural Lawn Care booklets were printed for distribution via various avenues.

## **S7B8g Illicit Storm Sewer Discharge Elimination**

## **SURFACE WATER MANAGEMENT (SuWM)**

### **Illicit discharge elimination program enhancement**

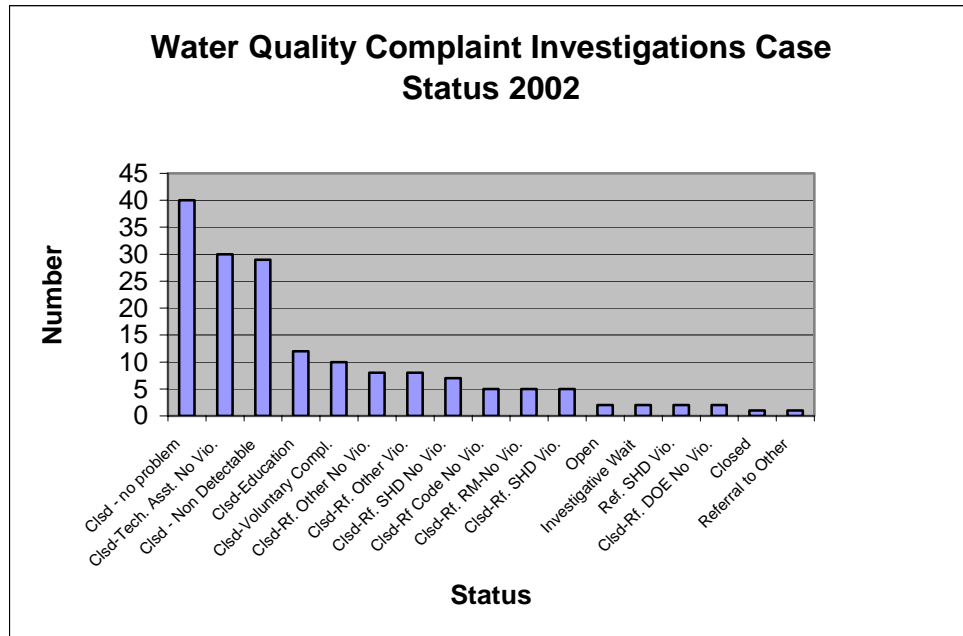
For half of 2002 an additional FTE was allocated to investigate water quality problems, investigate illicit discharges discovered during complaint investigation, and develop the systematic illicit discharge elimination program.

### **Water quality complaint investigation**

As discussed in Section S7B3 - Legal Authority, Snohomish County adopted a Water Pollution Control Ordinance (Snohomish County Code Chapter 7.53). SuWM staff have assisted the Code Enforcement section of PDS in their development of policies and procedures for enforcement of the ordinance. SuWM staff are responsible for investigating water quality problems, determining whether violations of the ordinance have occurred, and, if possible, identifying the parties responsible for the violations. If evidence of a violation is found and a responsible party is identified, information and evidence gathered by staff are turned over to PDS Code Enforcement staffs, who decide whether to proceed with an official enforcement action.

In 2002, SuWM responded to 132 complaints and conducted 37 investigations as part of an Outreach and Investigation project in the Little Bear Watershed. In total, 169 cases were input into the Water Quality Investigations database.

The case status graph below represents those 169 cases and the differing treatments as determined by water quality investigators.



Forty cases in 2002 were classified as “Closed-No Problem,” which refers to investigations in which simple visual observation did not indicate a water quality problem, and thus no field sampling or technical assistance was provided.

Thirty cases were classified as “Closed-Technical Assistance No Enforceable Violation of SCC 7.53,” which refers to investigations in which an investigator observed a potential water quality problem and an associated potential source, conducted an in-depth investigation, and possibly provided some technical assistance, but could not find enough evidence to document an enforceable violation of SCC 7.53.

Twenty-nine cases were closed with a “Non-detect” status. This refers to situations where an investigator observed evidence of pollution but could not determine a source. Seven cases were referred to Snohomish Health District (SHD) for violations of SCC 7.53, and 5 of these cases have found resolution through compliance with SHD’s requests.

Five cases during CY2002 were classified as “Ref. Code No Violation,” which refers to investigations in which a violation of SCC 7.53 could not be documented, but in which the investigator found junkyard conditions, potential violations of building permits, or structural safety issues of which PDS code enforcement staff should be notified.

Although it doesn’t appear in the Investigations Status graph on the preceding page, one case was referred to Planning and Development Services Code Enforcement for a violation of SCC 7.53. A construction company was illegally discharging turbid water to a County conveyance system that drains to Little Bear Creek. Code enforcement staff passed the violation onto the County Prosecuting Attorney who dismissed the issuance of a violation because the contractor took measures to remediate the discharge when investigators issued an on-site Water Quality Inspection form stating the violations and measures to rectify the problem. The case is currently re-opened and is on investigative wait, as the case has been referred to the Department of Ecology (DOE) and is pending an issuance of a violation of WAC 173-201A-030 for turbidity.

One case was referred to DOE and has been given the “Investigative Wait” status. The referral is pending further joint investigations with DOE and SuWM in order to conduct a thorough site investigation and provide technical feedback to site operators.

### **Development of illicit discharge elimination program**

Several improvements were made to both the complaint response program and dry weather outfall screening which will improve field data collection, database management and reporting.

Standard Operating Procedure (SOP) #WQR002-2002 for Water Quality Records (WQR2001) database was produced. The database and accompanying SOP were established to document, track and prioritize water quality complaints investigated by water quality staff. They serve SuWM’s mission by working in partnership with concerned citizens to protect and enhance water quality and aquatic habitats. The procedures set forth in the newly developed SOP promote efficiency, data comparability, credibility and legal defensibility, through standardization of data inputs.

Field investigation and case referral procedures for water quality complaint response are undergoing continual re-invention. Notification procedures for each outside group that works with SuWM vary and hence as cases involve new agency coordination, procedures are updated.



As advances in technology take place, investigative tools, gathering and routing of information must also change. The water quality investigation group has purchased a new field laptop for use on investigations and dry weather outfall screening. Geographical Information Software (Arcview 3.2) is used to layer the County's orthophotographs, man made drainage network, historical compliant responses and other pertinent information which enables investigators to quickly identify potential sources of pollution while in the field.

### **Dry Weather Outfall Screening**

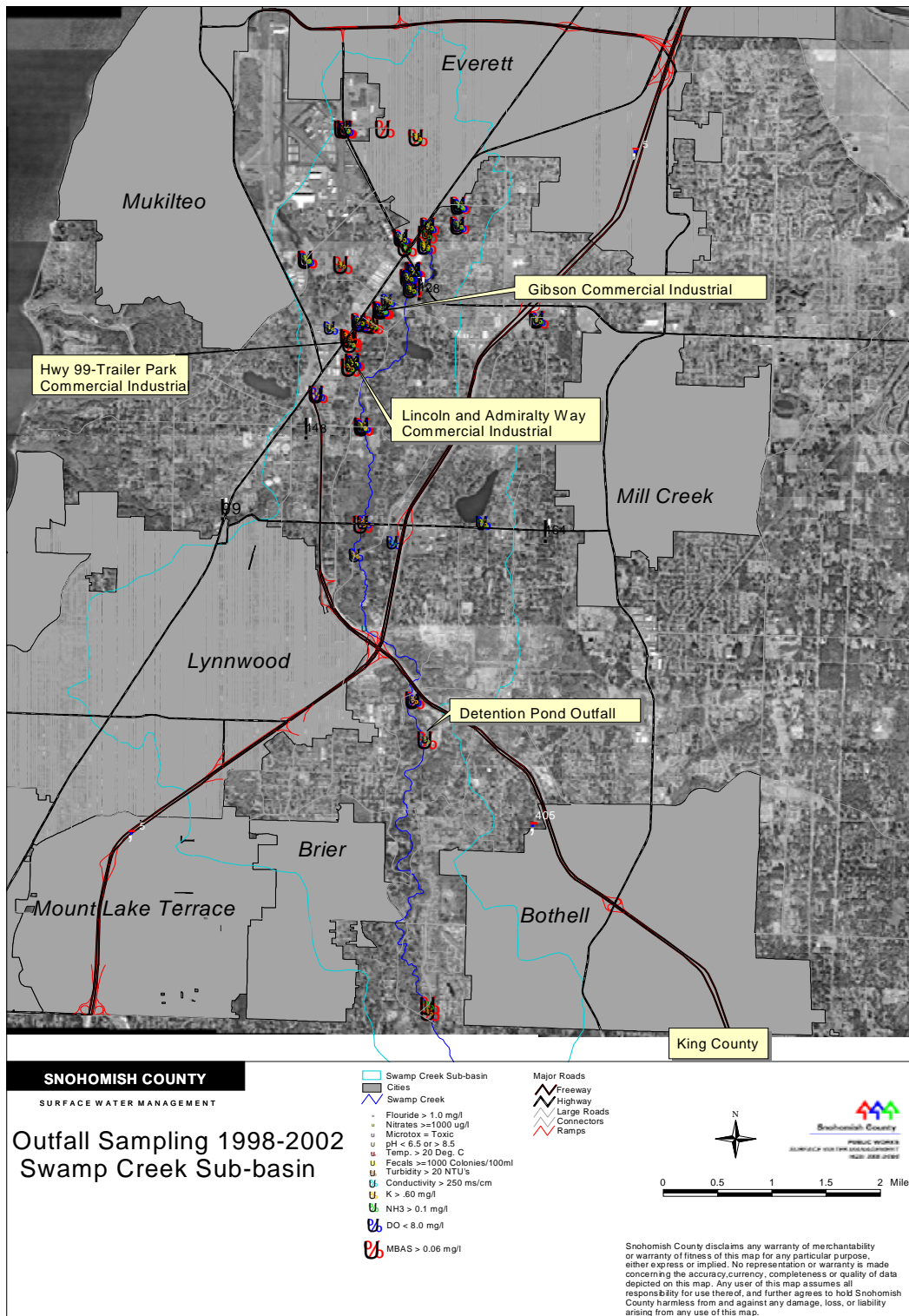
In 2002 100 outfalls were visited and samples collected for water quality at 75 of those visited. Since 1998, a total of 501 outfalls have been visited, and 50% have been sampled for a variety of water quality parameters. At each site, a Trimble Pathfinder Pro XR Global Positioning System (GPS) was used to gather sample locations, pipe size and material as well as water quality parameters measured using a variety of meters. The data is downloaded, from the Trimble, checked for accuracy and used for spatial and statistical analysis.

Of the sub-basins where water quality samples were taken during the dry weather outfall screening, Swamp and North Creek have consistently had higher frequencies of polluted outfalls than other sub-basins. Of all parameters, methyl blue active substances (MBAS) or soaps have been found to have the highest frequency of occurrences in these sub-basins, with 46 of 202 or 27.7% of samples exceeding acceptable limits in Swamp Creek (see map on next page) and 24 of 58 or 41.7% of outfalls sampled in North Creek from 1998-2002. In CY2002, outfalls sampled in Swamp Creek exhibited high levels of MBAS ( $>0.06\text{mg/l}$ ) in 6 of 9 or 66.6% of sampling occasions while high levels were found from 5 of 14 or 35.7% of outfalls in North Creek. These results are indicative with car washing activity that occurs during the summer months in the built up areas of the County where impervious surface dominates the landscape.

Future plans for the outfall screening data, include determining correlation between polluted outfalls and land use types such as impervious surface, forested, etc. Other tests include Pearson correlation test for high turbidities at contaminated sites and calculation of % false negative rates to determine when contamination may be present when none was detected.

The Outfall Screening map on the following page shows unacceptable test results for various parameters in the Swamp Creek sub-basin from 1998-2002. Spatial analysis aids in determining area specific sites in which pollution is consistently found. Outreach and education is then focused in a sub-basin where drainages are mapped and pollution sources more easily traced to the potential source.

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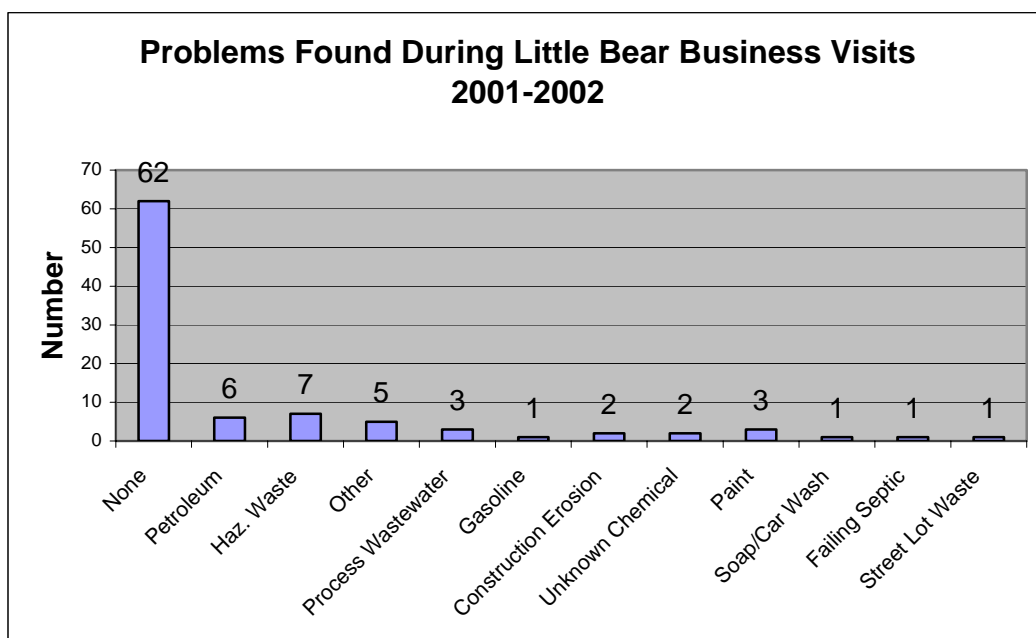
Project name: x:\wq\programs\outfall\all data\1998-2002\swamp creek\98-02.apr

Plot date: Dec 18, 2002; Swamp Creek Outfalls 98-02 SRB

## Area Specific Investigations

In 2001-2002, water quality staff of SuWM implemented a business outreach and drainage-mapping program in the Little Bear Creek watershed. The primary objective was to improve water quality in Little Bear Creek by providing business with technical assistance to improve use of Best Management Practices (BMPs), thereby minimizing the potential for polluted discharges of stormwater. Secondary objectives included the removal of illicit connections and determination of drainage patterns to assist in investigative efforts.

In total, 94 businesses were visited and interviews conducted, 18 businesses received technical assistance including 7 for the improper storage or handling of potentially hazardous waste. The Snohomish Health Department was notified on 6 occasions to assist businesses with proper management of hazardous wastes. As a result, several hundred gallons of potentially hazardous waste was removed and properly disposed of. The graph below summarizes those problems found while conducting business visits.



Stormwater runoff was sampled on eight occasions at a strategically selected site, to determine potential impacts to Little Bear Creek. The work and correspondence with outside agencies resulted in major modifications to BMPs, and the hiring of consultants to conduct third party soil and water quality monitoring at a long time problem site.

Outreach through technical assistance enabled field staff to better understand business practices in a discrete drainage that have the potential to contribute pollutants to the County drainage network. Informational interview data and water quality monitoring lent itself to detecting those businesses more likely to pollute, therefore triggering more in-depth research and case history profiles. Future outreach efforts will be organized by business SIC codes, and interviews held based upon the businesses NPDES permit type. Future water quality sampling plans should be developed for those businesses having complex practices after complete knowledge of the drainage network, and business practices are obtained. Comprehensive sampling from strategic locations will then yield an investigation that accurately describes pollution loading from individual businesses.

### **Spill response coordination with other agencies**

Water quality investigators coordinate with the Local Emergency Planning Committee and Ecology on spill response.

## **AIRPORT**

### **Prevention of Illicit Discharges from County Storage and handing of chemicals, including fuel discharges from County vehicle fueling.**

Goodrich had a couple AFFF releases from Hangar 1 and 3. Cleanup was monitored by Airport and Department of Ecology.

### **Inspection/modification of activities and facilities at tenant properties.**

Inspections were conducted at: BF Goodrich, Sunquest, Airport Maintenance and all aviation ramps.

### **Disconnection of aviation wash rack from storm sewer.**

No new activities were reported. All aviation wash racks have been disconnected.

### **Prevention of contamination from deicing chemicals applied to runways.**

Potassium Acetate is used for deicing runways. The Airport now has an operational deicing pad for widebody aircraft.

**Installation of spill containment equipment in County storm sewer and tenant facilities.**

No new activity. See modification of detention facilities.

**Spill response coordination with emergency response agencies.**

Coordination has occurred in accordance with the approved Program. No new activity.

**PLANNING AND DEVELOPMENT SERVICES (PDS)**

**Enforcement of stormwater pollution control ordinance Chapter 7.53 SCC.**

The water pollution control ordinance was adopted on March 11, 1998. PDS staff enforces this ordinance with the technical assistance of Surface Water Management personnel.

**Implementation of materials storage and containment requirements set forth in Volume IV of Ecology's Stormwater Management Manual**

As stated in Section IS7B3 and S7B8a of the program, the County adopted the 1992 Ecology Stormwater Management Manual with an addendum in September 1998. Following adoption, the County transmitted the addendum to Ecology for equivalency review. The County planned to develop its own manual, but the timing on this document production was put on hold pending resolution of potential use of the recently published 2001 DOE Stormwater Management Manual.

**Spill response coordination with emergency response agencies**

PDS's Fire Marshal and Building Official continue to coordinate emergency responses with other agencies like the Department of Emergency Management and the affected fire districts and meetings with the fire chiefs and technical advisory committees.

## **PARKS**

### **Animal wash rack water / Prevention of fuel discharges / Prevention of illicit discharges from County storage and handling of chemicals / Vehicle wash water discharges**

Practices continue to be in accordance with the approved Program.

#### **Spill response coordination with emergency response agencies.**

Practices continue to be in accordance with the approved Program. The emergency action plan for the Evergreen State Fairgrounds, completed in 2001 with the cooperation of the Snohomish County Department of Emergency Management, was implemented in 2002. The plan designates responsibility for various types of incidents, including those that involve hazardous materials.

## **ROAD MAINTENANCE (RM)**

### **Prevention of fuel discharges**

Fuel for most vehicles and equipment is obtained from commercial vendors. Above ground fuel storage tanks (AST's) are located at the Paine Field shop and the Sand Hill Pit. Fuel from these storage tanks is used for fueling equipment. The tanks are double-walled and meet the Federal EPA regulations for AST's. Containment areas surround the AST's to prevent discharge into the ground or stormwater runoff. Spill cleanup kits are carried in field vehicles to control and clean up any accidental spill in the field.

### **Prevention of illicit discharges from County storage and handling of chemicals.**

Petroleum products are stored on containment pallets and in hazardous materials storage bins. Paint products are stored in palletized containment vessels. Paint transfer is accomplished in an area that has total spill containment capacity. Cleanup of waterborne paint products is legally discharged into the City of Snohomish sanitary sewer system and has been permitted by DOE. All practices referred to in our plan are currently in effect.

### **Wash rack discharges**

The wash racks continue to be inspected regularly to assure that they are functioning properly. The catch basins and sumps are vacuolated out and the filters are changed on a routine or "as needed" basis. A tire wash facility has been

constructed at the Sand Hill Pit facility, to minimize the transport of sediments from the site.

### **Illicit discharge prevention during road maintenance field activities**

Vehicles and equipment carry spill containment and cleanup materials. Absorbent materials and disposal barrels are stored for easy access at Road Maintenance facilities. Dangerous waste management and spill response procedures have been developed to facilitate the expedient recovery of spilled materials. Equipment is well maintained and any leaks that may result in a discharge of petroleum or chemical products are contained, and promptly repaired.

### **Spill response coordination with emergency response agencies.**

No change during the term of this permit.

Practices have not changed from the previous reporting period. The division has developed dangerous waste management procedures. They include procedures for proper notification and coordination with the Department of Ecology and local emergency response personnel.

## **ENGINEERING SERVICES (ES)**

### **Spill containment equipment and supplies at County construction sites**

Contractors are required through contract provisions to keep spill containment equipment and supplies on County construction sites, in accordance with Ecology Stormwater Manual Volume II-3.

This practice will be continued through the term of the permit.

### **Materials handling and storage at County projects**

Contractors are required through contract provisions to prevent stormwater contamination due to materials handling and storage, in accordance with Ecology Stormwater Manual Volume II-3.

This practice will be continued through the term of the permit.

## **SOLID WASTE MANAGEMENT (SoWM)**

### **Prevention of illicit discharges from County storage and handling of chemicals**

Practices continue to keep MSW from contact with storm runoff at Solid Waste facilities. Waste receiving areas are frequently cleaned and washed to minimize material being tracked off site. In 2002 fourteen new drop box containers were put into service for recycling materials and metals collection. Drop box covers have sheet metal lids to keep precipitation out when the units are not being used.

During the SWPPP inspections, recycling areas at the Transfer Stations were checked for proper containment of auto waste collection and general cleanliness in addition to the normal inspection of storm drainage facilities. The containers that are provided at the auto waste areas to collect fluorescent tubes and bulbs are effective in controlling breakage. The new Transfer Stations are designed with central drainage to a blind sump and are covered to prevent rain contact with auto waste. New Spill Kits will be provided at the stations when they open for service.

In the closing months of 2002, the County embarked on collection of cathode ray tube and other electronics equipment that has been banned from landfilling. This will reduce the potential for lead and other toxic metals from leaching into the environment.

No chemical spills at the various Solid Waste sites were recorded for the year.

Although not related to County-owned material storage, Solid Waste has formed a team to accomplish cleanup and retrieval of illegally dumped material from road Right of Way, park property, Forest Service property and other public lands. Some private land is also designated for cleanup. Illegal dumping can result in contamination of the environment and impacts to stormwater, because favorite dumping sites are often drainage gullies and small streams. Material cleaned up can range from litter to tires to appliances and vehicles. Sometimes the material is toxic from illegal drug manufacturing. The project was started in 2001 and now continues as an ongoing effort. In 2002, 322 sites were cleaned up, resulting in proper disposal of 171 tons of trash and appliances and recycling of almost 200 vehicles.

### **Disposal options for hazardous waste from households and small quantity generators**

The County's Moderate Risk Waste (MRW) Facility continues to provide disposal and recycling services to households and qualified businesses located in the



county. In 2002, 3,224,616 lbs of hazardous waste were diverted from municipal solid waste and waste water systems in the county and safely disposed. 13,855 families delivered HHW to the County's facility in 2002.

Seven household hazardous waste collection events were conducted at the more remote towns of the county. Fluorescent and HID bulbs, propane tanks (seven gallon and smaller), motor oil, antifreeze, oil filters and lead acid batteries were collected, dry cell batteries were collected at eight solid waste facilities as well as at the MRW Facility. The County continues to sponsor, cooperatively with a local auto parts chain, 22 collection centers for oil, oil filters and antifreeze: 203,189 gallons of motor oil, 13,112 gallons of antifreeze, 40,445 lbs of oil filters, 601,665 lbs of lead acid batteries and 8,599 lbs of dry cell batteries were collected in 2002.

Three hundred and fifty-four Small Quantity Generators dropped off waste at the MRW Facility.

### **Spill response coordination with emergency response agencies**

Emergency phone numbers are posted at Solid Waste transfer stations, Drop Boxes and at Cathcart. Lists are current and laminated for durability. Trained staff at the Moderate Risk Waste facility is also available for advice in the event of a spill or emergency.

## **EQUIPMENT RENTAL AND REVOLVING (ER&R)**

### **Prevention of illicit discharges from County storage and handling of chemicals.**

No discharge of chemicals occurred January 1, 2002 through December 31, 2002 at Fleet Management Facilities. Other activities completed for the prevention of illicit discharges include:

- All Fleet Management shops have spill kits on site and portable spill kits have been purchased for all shop trucks that go on service calls in the field.
- The Mt. Pilchuck tank passed a tightness test in June, 2002.

## **S7B8h Industrial stormwater monitoring and control**

### **SURFACE WATER MANAGEMENT (SuWM)**

#### **Inventory of Industrial facilities**

The use of Ecology's facility site query at <http://apps.ecy.wa.gov/fs/fsstart.html>, combined with Metro Scan and Arcview, enables water quality investigators to develop a database with names, location, SIC code and permit type of Industries. The addresses for each facility are geo-coded and plotted over orthophotos and a County drainage layer. Complaint and proactive investigations are then better prepared to spatially identify potential sources of surface water pollution.

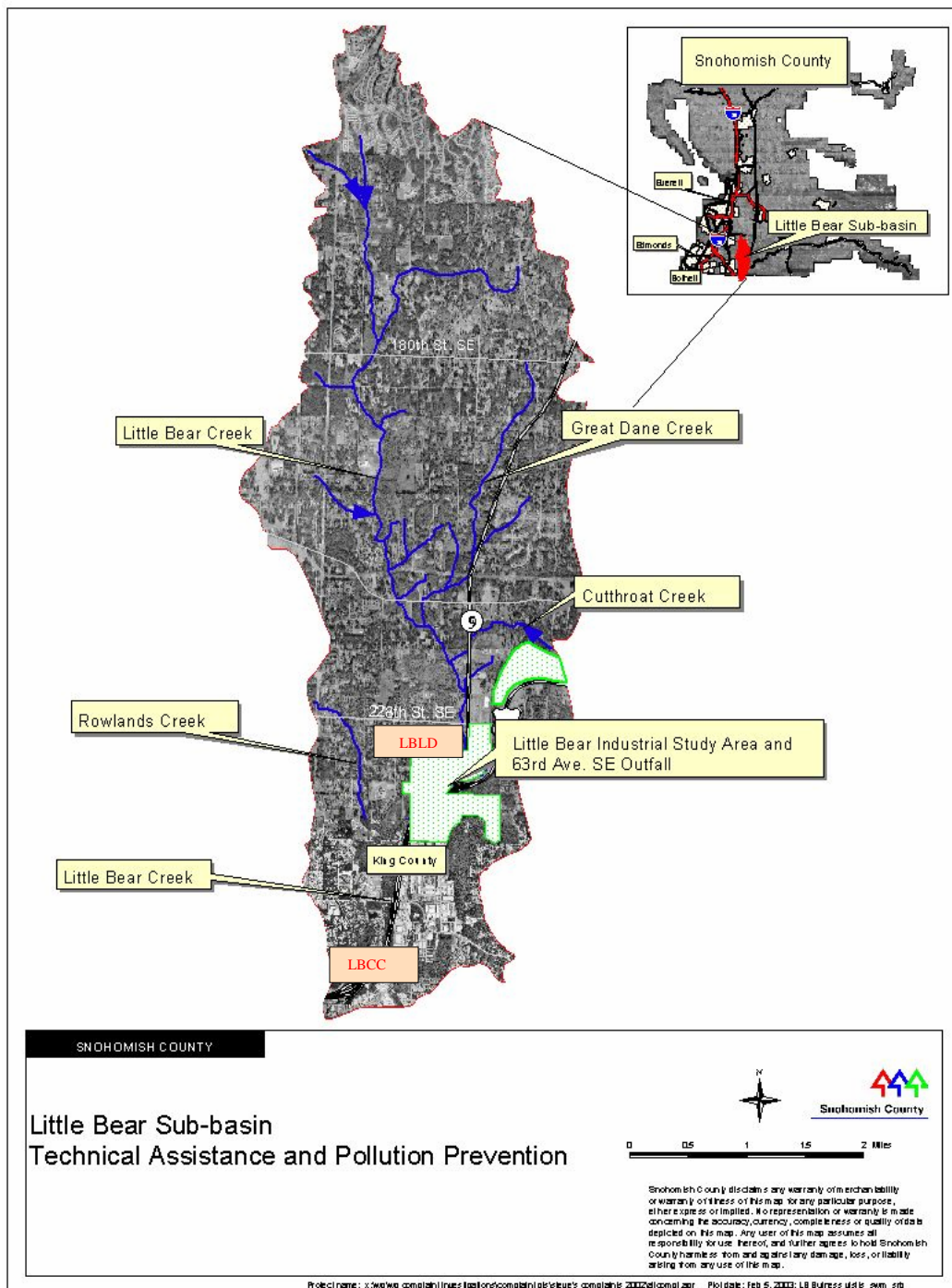
#### **Industrial Stormwater Monitoring**

As mentioned in S7B8g (Illicit Storm Sewer Discharge Elimination), industrial stormwater monitoring took place in the Little Bear sub-basin as part of a business outreach and drainage-mapping program. The map on the following page shows sampling sites in this effort.

Wet weather sampling from the 63<sup>rd</sup> Ave SE Industrial/ Commercial outfall in the Little Bear Creek watershed began on September 19<sup>th</sup>, 2001 and ended on March 26<sup>th</sup> 2002. Descriptive statistics for the sample data are illustrated in Table 8.

The 63<sup>rd</sup> Ave SE. outfall was chosen due to its location in a discrete drainage network before entering Little Bear Creek. Little Bear has also been designated as Class AA waters under WAC 173-201A, and was included on Washington States 303(d) list for violations of fecal coliforms in 1996 and 1998.

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**Table 8 - 63<sup>rd</sup> Ave SE Commercial Industrial Outfall Sampling: Descriptive Statistics**

<i>Date</i>	<i>Temperature</i>	<i>DO</i>	<i>pH</i>	<i>Conductivity</i>	<i>Turbidity</i>	<i>Micro-tox</i>	<i>TSS</i>	<i>Fluoride</i>	<i>Nitrate/Nitrite</i>	<i>Phosphorus</i>	<i>MBAS</i>	<i>Fecal coliform</i>
	Celsius	mg/l	units	uhmos/cm	NTU		mg/L	mg/L	ug/L	mg/L	mg/L	CFU/100 ml
19-Sep-01	13.4	6.8	6.91	188	1.44	NS	1	0.0911	1180	0.0682	0.0432	ND
22-Oct-01	NS	NS	NS	NS	NS	nontoxic	NA	0.0761	1150	NS	0.0419	820
22-Oct-01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	12,000
31-Oct-01	11.4	7.26	7.12	168.3	2.59	NS	4	0.0973	1010	0.0623	0.0492	1200
26-Nov-01	10.1	7.11	6.8	161.5	1.98	nontoxic	3	0	1120	0.05	0.0317	ND
20-Feb-02	10.1	7.61	6.97	171.2	2.25	nontoxic	3	0.102	1200	0.0463	0.0245	290
21-Mar-02	9.7	7.43	6.97	170.4	5.7	non toxic	0	0.0778	1200	0.06	0.0545	380
26-Mar-02	9.1	7.6	6.97	171	5	nontoxic	2	0.0648	1220	0.0438	0.0301	63
<b>Min</b>	9.1	6.8	6.8	161.5	1.44	0	0	0	1010	0.0438	0.0245	63
<b>Max</b>	<b>13.4</b>	7.61	7.12	188	5.7	0	4	0.102	<b>1220</b>	<b>0.0682</b>	0.0545	<b>12000</b>
<b>Avg</b>	10.63	7.30	6.96	171.73	3.16	#DIV/0!	2.17	0.07	1154.29	0.06	0.04	2458.83
<b>StDev</b>	1.55	0.31	0.10	8.76	1.75	#DIV/0!	1.47	0.03	72.08	0.01	0.01	4691.90
<b>Median</b>	10.1	7.345	6.97	170.7	2.42	#NUM!	2.5	0.0778	<b>1180</b>	0.055	0.0419	<b>600</b>
<b>Number</b>	6	6	6	6	6	0	6	7	7	6	7	6

NS=no sample  
ND=None detect  
NA=None available

Descriptive statistics for field parameters sampled at the 63<sup>rd</sup> Ave. SE outfall provide data for comparison to Surface Water Managements Ambient Water Quality sampling stations both upstream (LBLD) and downstream (LBCC) of the outfall (see map pg. 60). Truncated wet weather (Oct.-March) datasets (n=15) for LBLD and LBCC are used for Paired t tests and Wilcoxon signed ranks test for abnormal distributions to determine whether inputs from the 63<sup>rd</sup> Ave. SE outfall contribute to mean differences among the sample populations from LBLD to LBCC.

Temperature, dissolved oxygen and fecal coliform concentrations are of most interest in terms of water quality parameters with regards to listing of Little Bear Creek on Ecology's 303d list.

### Temperature

The average wet weather water temperature (AWWWT) measured at the 63<sup>rd</sup> Ave SE. discharge was 10.1°C. This is 2.7°C warmer than the AWWWT measured (n=15) at the ambient sampling location LBLD located approximately .46 miles upstream of the 63<sup>rd</sup> Ave SE discharge. The AWWWT from Oct. 2000-March of 2002 (n=15) at LBLD was 7.4 °C. Furthermore, the AWWWT was measured to be 7.9°C at the ambient monitoring station near the mouth of Little Bear Creek (LBCC) , approximately 2.6 miles downstream of the 63<sup>rd</sup> Ave. SE outfall (see map pg 60). Hence an increase in the AWWWT of 0.5°C is seen from October 2000 through March 2002 between LBLD and LBCC sample locations.

To statistically determine whether the AWWWT at LBLD and LBCC are different, tests for variance and normality were first run. Variances between the AWWWT at LBLD and LBCC have been determined to be equal through use of and F test. Normality tests for AWWWT at LBLD and LBCC exhibited Shapiro Wilk test p values of 0.4642 and 0.3083, while the skewness coefficients where 0.2229 and 0.2924 respectively, thereby exhibiting normality.

Using a 0.05 level of significance, the paired T-tests p value was calculated to be 0.0000935978, which is less than the critical t value of -2.14. Therefore, using the paired T-test, we conclude that the AWWWT upstream (LBLD) and downstream (LBCC) of the 63<sup>rd</sup> Ave. SE outfall are statistically different.

The conclusion is that discharges such as the outfall at 63<sup>rd</sup> Ave. SE may be influencing stream temperatures along the 3 mile stretch in Little Bear Creek between ambient water quality stations LBLD and LBCC. Further study should include mapping of primary inputs and localized monitoring during the summer months.

### Dissolved Oxygen

The average wet weather measurement (AWWM) for dissolved oxygen (DO) at the 63<sup>rd</sup> Ave SE outfall was 7.40mg/l. This is well below the standards for both class AA and A waters where levels must exceed 9.5mg/l and 8.0mg/l respectively. The AWWM for DO at LBLD was 11.4mg/l and downstream measurements at LBCC were 11.5mg/l. These levels are well above the class AA standards. To determine whether the AWWM for Do at LBLD and LBCC were different and hence the inputs between responsible for the difference, a series of tests were run.

A two sample F-test for variance between the AWWM at LBLD and LBCC resulted in a p value of 0.466 which is greater than the critical F value of 0.40. Therefore, the variances are not statistically different. Normality tests for the AWWM of Do at LBLD and LBCC returned Shapiro Wilk test p values of 0.0481 and .1062, while skewness was -0.0534 and -0.7679 respectively. Using these normality test results, the AWWM for Do at LBLD is considered abnormal and LBCC is normal. Since hypothesis testing based on normality are effected by outliers, a Wilcoxon sign ranks test was used to determine differences in the AWWM for DO at LBLD and LBCC.

The Wilcoxon's test for pairs returned p value is 0.0020 indicating that the differences are significantly different from zero, hence the paired differences between DO measurements at LBLD and LBCC are statistically different.

As with temperature, inputs to Little Bear Creek along the 3-mile stretch between LBLD and LBCC could be affecting Dissolved Oxygen levels. GIS analysis of significant inputs and site specific monitoring during the summer months is suggested.

### Fecal Coliforms

A total of 6 wet weather samples for fecal coliforms were taken at the 63<sup>rd</sup> Ave. SE outfall from October 2001-March 2002. The AWWM for fecal coliforms (FC) was 600 CFU/100ml while results ranged from 53 to 12,000, thereby producing a standard deviation of 4,691 CFU's. In contrast, ambient station LBLD, upstream of the outfall, over the same period (n=15) exhibited an AWWM of 413 CFU's, while the minimum and maximum were 5 and 2,400 CFU's respectively. Note the large difference between the maximums.

Furthermore, the AWWM for FC was measured to be 567 CFU/100ml at the ambient station LBCC, approximately 2.6 miles downstream of the 63<sup>rd</sup> Ave. SE outfall. Hence an increase in the AWWM for FC of 153 CFU/100ml is seen from October 2000 through March 2002 between LBLD and LBCC sample locations.

To statistically determine whether the AWWM for FC at LBLD and LBCC are different, all data was first log transformed and the tested for normality. Shapiro Wilk test returned p values of 0.6306 for LBLD (normal) and 0.03 for LBCC (abnormal). Given the outliers still present in the LBCC dataset after log transformation, and the subsequent non-normality exhibited, a Wilcoxon sign ranks test for pairs was run to determine the paired differences. A returned p value of 0.3396 > 0.05 level of significance, therefore we conclude that the paired difference to zero is not significant and we accept the null hypothesis, the AWWM for FC at LBLD = LBCC.

The discharges of fecal coliforms between ambient stations LBLD and LBCC during the wet season may not be impacting downstream levels. However, with the highly variable datasets, it is suggested that additional monitoring be conducted in this reach to determine other significant inputs and their associated contributions to fecal coliforms during the dry season.

### **Mechanisms to ensure compliance with County requirements for industrial stormwater pollution control**

Complaint call response, outfall screening and business outreach are used to ensure compliance with County requirements for industrial stormwater pollution control.

### **Method for referring industrial problems to Ecology**

Water quality investigators in SuWM worked with Ecology staff from the Northwest Regional Office on many occasions during 2002. Joint site visits resulted in voluntary compliance at building sites and auto recyclers. In total, 4 cases were officially referred to Ecology via direct conversation with Investigators. Ecology's ERTS hotline is also used as an official method of referring complaints associated with industrial activity.

## **AIRPORT**

### **Stormwater monitoring at the Airport**

Inspections were performed in accordance with the Airport's Industrial NPDES Stormwater Permit.

## **PLANNING AND DEVELOPMENT SERVICES**

### **Provision of NPDES Notice Of Intent (NOI) forms for proposed industrial development**

The County provides NOI forms for proposed industrial development at the PDS reception counter.

### **Provision of information about illicit discharge prevention**

PDS monitors this type of activity via complaint investigation and or mark ups on the engineering plans for stormwater control for all land development activity that creates or redevelops 5000 square feet of new impervious surface. These are the type of sites that are subject to a full drainage plan review. Through this type of review and mark up compliance with the DOE Manual is determined for industrial sites. A very small percentage of new sites appear to be affected by the illicit discharge requirements.

The County requires the plans be modified to comply with the DOE Manual BMPs if illicit discharge is an issue. If the applicant implements the plans they usually would be effective.

### **Review of construction documents and inspection of new construction to assure compliance with County requirements for control of industrial pollution**

PDS monitors this type of activity via inspection or mark ups on the engineering plans for stormwater control. Primarily, Volume IV Urban Land Use BMPs in the DOE Manual covers items to be reviewed for industrial sites. The source control component is key to this type of activity. Proper container storage, liquid storage and loading and unloading of industrial wastes are some of the types of activities that these BMPs try to address.

The County requires the plans to be modified to comply with the DOE Manual BMPs if industrial pollution is a potential.



## **SOLID WASTE MANAGEMENT (SoWM)**

### **Stormwater monitoring at County solid waste facilities regulated by NPDES industrial stormwater discharge permits**

Stormwater monitoring was performed for the year at NPDES industrial permitted sites as required by other agencies (SHD and/or municipal requirements). Budgeted amount was not met because there were fewer storm events in 2002 and thus fewer samples taken than in a typical year. A total of seventy-eight (79) stormwater samples were analyzed.

### **S7B8i - Education**

## **PLANNING AND DEVELOPMENT SERVICES (PDS)**

### **Employee education**

The Planning and Development Services staff completed several workshops and training seminars during 2002 subsequent to implementation of the drainage and grading ordinances. The training sessions emphasized how important the staff's role is in inspecting stormwater pollution.

Beneficial uses such as fish usage of streams and wetlands, swimming and maintenance of clean drinking water supply were emphasized. By being better informed, staff are able to make quality decisions about whether or not a particular activity would degrade water quality via stormwater runoff. The staff were empowered to make these field decisions if violations of SCC 7. were being created.

PDS has implemented regular training of employees for erosion control. The ongoing training of PDS staff was a workplan element for 2002. The level of compliance in the field has improved considerably subsequent to the new ordinance adoption, and initiation of educational training efforts. Also, recent technological advancements such as Chitosan, PAM application and mulch berm/soil amendment techniques have been shown to improve water quality. Thus PDS believes these measures are effective if fully implemented. However, it is still apparent that there is room for improvement and that stems from a lack of resources to fully monitor and inspect job sites on a daily basis. Workload and staffing prohibit a visit to every site except when an inspection is called into PDS. There was a marked increase in agricultural and road building activity that was exempt due to recent passage of the Right to Plow initiative by the voters.

Weekly training sessions are occurring in-house within PDS. Clearly, additional

resources in the training effort would improve effectiveness. In the interim, the county again partnered with Edmonds Community College last year to get the DOE/County erosion control and BMP message out to the contracting and building industry community.

We solicit feedback on a regular basis from staff to see if they have questions regarding their duties and responsibilities. Compliance has improved, however the total number of violations and stop work orders has also increased as a result of this education and empowerment effort of staff. A Low Impact Development (LID) regional seminar was sponsored by, PDS last June at Warm Beach in concert with the Puget Sound Water Quality Action Team. Feedback from the students was positive. The focus was to reach a goal of less impact or zero impact from drainage tied to new development.

PDS employees requested a minimal number of off-campus educational opportunities on this subject during the previous year. Although a number of the drainage plan review staff took the opportunity to become trained on the new 2001 DOE Stormwater Management Manual. The drainage plans examination, grading, site review, commercial inspection and right of way staff meet weekly to stay current on erosion control issues and problems. The PDS drainage staff also meets monthly with surface water staff to review drainage complaints, maintenance issues, and what is practical that works in the field. In-house training dominates the PDS effort. Qualified PDS staff assisted in team teaching several full day college courses on zero impact development and erosion control to college students and builders at Edmonds Community College where the County again partnered with the college to educate the public.

## **AIRPORT**

### **Employee education**

Airport employees received education about stormwater pollution prevention in the course of related training. This practice will be continued during the term of the permit.

### **Public Education**

Information about stormwater pollution prevention was provided to Airport tenants during routine inspections.

## **PARKS**

### **Employee Education**

Park initiated a process in 2002 to standardize maintenance practices. As this process proceeds in 2003, maintenance and rangers will receive continuing reinforcement regarding spill response and stormwater pollution prevention.

The Parks Habitat Steward received continuing education and training regarding pesticide application including application in aquatic conditions. The Steward also shares information with rangers and maintenance personnel regarding her role in vegetation management, pesticide/fertilizer application and noxious weed control.

## **ROAD MAINTENANCE (RM)**

### **Employee education**

Road Maintenance employees continue to receive training and education about stormwater pollution prevention and erosion control best management practices (BMPs). Snohomish County Road Maintenance has been an active participant in developing a training program on BMPs for water quality and fish habitat protection. The training program was developed at the request of, and under the guidance of the Regional Road Maintenance Endangered Species Act Technical Working Group. The Washington State Department of Transportation Technology Transfer Center administers the training program. The University of Washington developed the training curriculum. Snohomish County Road Maintenance will have all road workers trained in the implementation of BMPs under this program. In 2002, approximately 60 Road Maintenance employees attended four training classes in Endangered Species Act education and BMP application. Road Maintenance staff will continue to be trained in these practices. A hazardous waste response team has attended the *Hazardous Materials Training* program and can respond to assist in the clean up of hazardous waste spills.

Staff involved in the control of street wastes meet frequently with their counterparts in other municipalities to discuss methods of minimizing pollution while maximizing operational efficiencies and cost. Examples of this are the work being done relating to the collection and recycling or disposal of vector grit and street sweepings.

Ecology Best Management Practices have been established at the County's Sand Hill Gravel Pit for the prevention of water pollution and soil erosion. The

employees working at that facility have been trained in the application and monitoring of these practices to ensure that the Pit is in compliance. Regular monthly meetings are being held with Washington Department of Fish and Wildlife Area Habitat Biologists. The purpose of these meetings is to discuss upcoming maintenance activities such as ditch cleaning, shoulder repairs, culvert replacement, etc., where the work occurs in or near water bodies. Discussion topics include timing of work, best management practices to be implemented during the work, enlarging culverts for fish passage, possible long term solutions to chronic maintenance problems, and possible mitigation measures.

## **SOLID WASTE MANAGEMENT (SoWM)**

### **Employee education**

Walk-through refresher training was conducted for site managers during the six NPDES Wet and Dry inspections. New employees are instructed on facility day-to-day operations including proper daily cleanup and washdown, as well as surveillance and cleanup of recycling areas. A spill prevention and spill cleanup video is being incorporated into training for Operations staff members. Transfer station staff and site maintenance personnel receive this training

### **Public education**

The Solid Waste Management Division provides brochures, pamphlets and flyers to the public on a wide variety of topics including composting, environmentally friendly lawn and garden care methods, automotive maintenance, less toxic products, and general home maintenance methods friendly to the environment. These materials were updated and reprinted, and new brochures developed during the year. The intent is to convince families to remove hazardous waste from their homes, to reduce their purchases of hazardous products, and to store these products safely. The materials are distributed through a variety of outlets, including the MRW facility, Transfer Stations and Drop Boxes, schools, libraries, and cooperatively with other cities and agencies.

The County's 14 school districts are being surveyed for integrated pest management practices and being offered technical assistance to reduce use of chemicals on school grounds. Planning for this effort and some initial survey work took place in 2002. The effort will continue in 2003.

### **Small Quantity Generator (SQG) education**

Three hundred fifty four SQG's disposed of their hazardous waste at the County's Moderate Risk Waste Facility in 2002.

Thirteen EnviroStars businesses received renewal visits in 2002, maintaining their participation in the program. There were three complaint visits. Visits discussed proper storage of materials and improvement in recycling of solid waste.

### **Outreach**

A consultant (Cascadia) and County staff conducted initial on-site technical assistance and follow-up visits to 15 businesses in Snohomish County. This process entailed contacting the business, scheduling a visit time, conducting an on-site walk-through, following up with the business, coordinating with the Solid Waste office to mail out letters and any information the business might need, and helping the business fill out its EnviroStars worksheet.

**EnviroStar renewals:** Solid Waste staff conducted renewal visits to 13 EnviroStars businesses.

**New EnviroStars:** The County qualified 8 new EnviroStars during this time period, for a new total of 52 Snohomish County EnviroStar businesses. One business, Magna Design, upgraded from a 3-star to four star rating by significantly decreasing solid waste generation by 50% and increasing wood waste recycling through improved sorting. They also renewed their efforts to recycle fluorescent bulbs.

**Success stories:** The County PIE staff wrote and distributed 8 new EnviroStars success stories for publication in local media.

## **SURFACE WATER MANAGEMENT (SuWM)**

### **Employee Education**

The following educational presentations were given to SuWM employees.

<u>Date</u>	<u>Topic</u>	<u>% related to water quality</u>
1/15	SUWM 101 Quiz	33%
2/5	Results of SUWM 101 Quiz	33%
2/19	WQ Violations	100%
4/2	History of SUWM, T 25 & 25A	33%
6/4	NPDES, WQ standards, 303D List & TMDLs	100%
6/18	Outreach, Communication, Web presence	20%
7/2	Know your w'shed: The rural character of the Stilly	20%
7/16	Know your w'shed: The mostly rural character of the Sno	20%
8/6	Know your w'shed: The urban character of So County Crs	20%
9/3	How we use biological indicators to determine WQ	100%
9/17	Pacific Salmon - life histories	20%
10/1	What does Title 24 require developers to do?	20%

### **Public education conducted during other SuWM activities**

SuWM education and public involvement staff responded to 1,259 requests from citizens wanting educational or technical information.

Staff spent approximately 10,670 hours responding to questions and problems from the public. Stream signs were placed at road crossing on 18 streams in the Lower Pilchuck Sub-Basin and tributaries that discharge into Ebey Slough.

SUWM staff distributed educational materials to 50 streamside landowners in the Quilceda/Allen watershed and during community events. A SuWM volunteer group placed 's educational packet for distribution in the Snohomish Public Library's web site includes information on water quality. The public was engaged at our internet site 46,508 contact hours.

### **General Public Education**

#### Watershed Keeper Series

3/4-5/13/02 Watershed Keeper Class - a total of 23 citizens participated in this eleven-week (47-hour) series. (1,081 contact hours)

9/19-11/21/02 Watershed Keeper Class - a total of 14 citizens expressed interest in attending this ten-week (44-hour) series, the series was cancelled. (0 contact hours)

The topics of water quality, nonpoint pollution sources, pollution prevention, and BMPs were woven into discussions nearly every evening. It is estimated that water quality was the focus of approximately 40% of the series.

### Citizen Workshops

Seven workshops were conducted for streamside landowners. The workshops addressed all issues related to stream stewardship, including preventing and reducing pollution. 158 people attended these workshops.

Three 90-minute workshops were held to train 87 Salmon Watchers. (9/16 in Everett, 9/30 in Marysville, 10/2 in Monroe). Additional training sessions were held for nearly 235 students. The primary focus of these workshops was salmon identification, however, about 10% dealt reporting problems that might encountered while Salmon Watching – including water pollution. (483 contact hours)

### Teacher Workshops

2/26/02 Learning About the Land - a total of 7 educators participated in this 4-hour workshop held in Everett. The primary topic was land use, however, approximately 20% of workshop tied back to water quality, nonpoint pollution sources, and pollution prevention. (28 contact hours)

8/13,14,15/02 Project WET & Aquatic Wild – a total of 26 educators participated in this 20-hour workshop held at the PUD in Everett. The primary theme was using water resources as a theme to integrate required topics. More than 50% of the activities demonstrated to the teachers focused on water quality, nonpoint pollution sources, pollution prevention, and BMPs. (520 contact hours)

10/4 & 5/02 Salmon in Your Backyard - a total of 23 educators participated in this 10-hour workshop held at the PUD in Everett. The primary topic was salmon, however, approximately 20% of workshop tied back to water quality, nonpoint pollution sources, and pollution prevention. (230 contact hours)

11/16/02 River of Words - a total of 18 educators participated in this 7-hour workshop held at Camp Killoqua north of Everett. The primary theme was using poetry and art to study watersheds, water quality, drainage/flooding, and salmon.

Approximately 30% of workshop tied back to water quality, nonpoint pollution sources, and pollution prevention (126 contact hours).

### Watershed Tours

10/19/2002 a 7.5-hour watershed tour of the North and Swamp Creek watersheds was planned. Only 5 citizens indicated an interest in the tour and the event was canceled (0 contact hours).

### Community fairs

Staff participated in 3 fairs and community events throughout the county including the Festival of the River and conducted 3 beach workshops.

### **Farm/Livestock Owner Education**

Farm Management Workshops sponsored by the Snohomish Conservation District included the Dairy Summit, Horses for Clean Water, and Spring Farm Fair Workshop.

The Snohomish Conservation District published and distributed four editions of the Nexus, their quarterly newspaper. They also designed and distributed a general information flyer on SCD services for small-scale farmers.

The Snohomish Conservation District attended and participated in numerous fairs and festivals, including the Silvana Fair, Stanwood-Camano Fair, Evergreen State Fair, and Robe Valley Days.

### **Onsite Sewage System Owner Education**

SUWM staff supported the Puget Sound Water Quality Action team in presenting a workshop for owners of on-site sewage systems. 25 people attended the workshop. SUWM provided funding for the production of workshop materials and staff assisted at the workshop.

## **EQUIPMENT RENTAL AND REVOLVING (ER&R)**

### **Employee education**

ER&R staff received training and information regarding pollution prevention and spill control through regularly scheduled safety meetings



## **ENGINEERING SERVICES (ES)**

### **Employee education**

ES employees receive education about stormwater pollution prevention in the course of specific targeted and related formal and informal training. For example, ES contracted with WSDOT to present formal 2-day certification training in Construction Site Erosion and Sediment Control (CSESC) to over 50 employees in December 1999. This included all construction group employees and most designers. Education continues in staff meetings and on-the-job experience, and with new employees being sent to formal training. All employees will attend TRANSPEED/AGC's CSESC training in the coming year.

These practices will continue during the term of the permit.